

GLOBAL JOURNAL

OF COMPUTER SCIENCE AND TECHNOLOGY: E

Network, Web & Security

Denial of Service Attacks

Automatic Gait Recognition

Highlights

New Networks Intrusion

Flexible & Efficient Software

Discovering Thoughts, Inventing Future

VOLUME 17

ISSUE 1

VERSION 1.0



GLOBAL JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY: E
NETWORK, WEB & SECURITY

GLOBAL JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY: E
NETWORK, WEB & SECURITY

VOLUME 17 ISSUE 1 (VER. 1.0)

OPEN ASSOCIATION OF RESEARCH SOCIETY

© Global Journal of Computer Science and Technology. 2017.

All rights reserved.

This is a special issue published in version 1.0 of "Global Journal of Computer Science and Technology" By Global Journals Inc.

All articles are open access articles distributed under "Global Journal of Computer Science and Technology"

Reading License, which permits restricted use. Entire contents are copyright by of "Global Journal of Computer Science and Technology" unless otherwise noted on specific articles.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without written permission.

The opinions and statements made in this book are those of the authors concerned. Ultraculture has not verified and neither confirms nor denies any of the foregoing and no warranty or fitness is implied.

Engage with the contents herein at your own risk.

The use of this journal, and the terms and conditions for our providing information, is governed by our Disclaimer, Terms and Conditions and Privacy Policy given on our website <http://globaljournals.us/terms-and-condition/menu-id-1463/>

By referring / using / reading / any type of association / referencing this journal, this signifies and you acknowledge that you have read them and that you accept and will be bound by the terms thereof.

All information, journals, this journal, activities undertaken, materials, services and our website, terms and conditions, privacy policy, and this journal is subject to change anytime without any prior notice.

Incorporation No.: 0423089
License No.: 42125/022010/1186
Registration No.: 430374
Import-Export Code: 1109007027
Employer Identification Number (EIN):
USA Tax ID: 98-0673427

Global Journals Inc.

(A Delaware USA Incorporation with "Good Standing"; Reg. Number: 0423089)

Sponsors: Open Association of Research Society
Open Scientific Standards

Publisher's Headquarters office

Global Journals® Headquarters
945th Concord Streets,
Framingham Massachusetts Pin: 01701,
United States of America
USA Toll Free: +001-888-839-7392
USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Global Journals Incorporated
2nd, Lansdowne, Lansdowne Rd., Croydon-Surrey,
Pin: CR9 2ER, United Kingdom

Packaging & Continental Dispatching

Global Journals
E-3130 Sudama Nagar, Near Gopur Square,
Indore, M.P., Pin: 452009, India

Find a correspondence nodal officer near you

To find nodal officer of your country, please email us at local@globaljournals.org

eContacts

Press Inquiries: press@globaljournals.org
Investor Inquiries: investors@globaljournals.org
Technical Support: technology@globaljournals.org
Media & Releases: media@globaljournals.org

Pricing (Including by Air Parcel Charges):

For Authors:

22 USD (B/W) & 50 USD (Color)
Yearly Subscription (Personal & Institutional):
200 USD (B/W) & 250 USD (Color)

GLOBAL JOURNALS CONSTITUTIONAL EDITORIAL BOARD

~INTEGRATED~

Dr. Charles A. Rarick

Ph.D.
Professor of International Business
College of Business
Purdue University Northwest
Hammond, Indiana USA

Dr. Osman Balci, Professor

Department of Computer Science
Virginia Tech, Virginia University
Ph.D. and M.S. Syracuse University, Syracuse, New York
M.S. and B.S. Bogazici University, Istanbul, Turkey
Web: manta.cs.vt.edu/balci

Dr. A. Heidari

Ph.D, D.Sc, Faculty of Chemistry
California South University (CSU),
United Stated

Dr. Miklas Scholz

B.Eng. (equiv), PgC, MSc, Ph.D, CWEM, C.Env., CSci,
C.Eng.
Nigeria Health, Wellness and Fitness
University of Lund

Dr. Maria Gullo

Ph.D, Food Science and Technology
University of Catania
Department of Agricultural and Food Sciences
University of Modena and Reggio Emilia, Italy

Dr. Qiang Wu

Ph.D University of Technology, Sydney
Department of Mathematics,
Physics and Electrical Engineering
Northumbria University

Dr. Bingyun Li

Ph.D Fellow, IAES
Guest Researcher, NIOSH, CDC, Morgantown, WV
Institute of Nano and Biotechnologies
West Virginia University, US

Dr. Audeh Ahmad Ahmad

Amman Arab University For Higher Education
Ph.D, Accounting-Ais
Faculty of Business Administration
Alalbyt University, Jordan, Amman

Dr. Lucian Baia

Ph.D Julius-Maximilians University Würzburg, Germany
Associate professor
Department of Condensed Matter Physics and
Advanced Technologies, Babes-Bolyai University,
Romania

Dr. Sahraoui Chaieb

PhD Physics and Chemical Physics
M.S. Theoretical Physics
B.S. Physics, École Normale Supérieure, Paris
Associate Professor, Bioscience
King Abdullah University of Science and Technology

Dr. Houfa Shen

Ph.D Manufacturing Engineering,
Mechanical Engineering, Structural Engineering
Department of Mechanical Engineering
Tsinghua University, China

Dr. Arshak Poghossian

Ph.D Solid-State Physics
Leningrad Electrotechnic Institute, Russia
Institute of Nano and Biotechnologies
Aachen University of Applied Sciences, Germany

Dr. A. Stegou-Sagia

Ph.D Mechanical Engineering, Environmental
Engineering School of Mechanical Engineering
National Technical University of Athens

Giuseppe A Provenzano

Irrigation and Water Management, Soil Science,
Water Science Hydraulic Engineering
Dept. of Agricultural and Forest Sciences
Universita di Palermo, Italy

Dr. Ciprian LĂPUȘAN

Ph. D in Mechanical Engineering
Technical University of Cluj-Napoca
Cluj-Napoca (Romania)

Dr. Haijian Shi

Ph.D Civil Engineering Structural Engineering
Oakland, CA, United States

Dr. Yogita Bajpai

Ph.D Senior Aerospace/Mechanical/
Aeronautical Engineering professional
M.Sc. Mechanical Engineering
M.Sc. Aeronautical Engineering
B.Sc. Vehicle Engineering
Orange County, California, USA

Dr. Abdurrahman Arslanyilmaz

Computer Science & Information Systems Department
Youngstown State University
Ph.D., Texas A&M University
University of Missouri, Columbia
Gazi University, Turkey
Web:cis.yzu.edu/~aarslanyilmaz/professional_web

Dr. Chao Wang

Ph.D. in Computational Mechanics
Rosharon, TX, USA

Dr. Adel Al Jumaily

Ph.D Electrical Engineering (AI)
Faculty of Engineering and IT
University of Technology, Sydney

Kitipong Jaojaruek

B. Eng, M. Eng D. Eng (Energy Technology, Asian
Institute of Technology).
Kasetsart University Kamphaeng Saen (KPS) Campus
Energy Research Laboratory of Mechanical Engineering

Dr. Mauro Lenzi

Ph.D, Biological Science, Pisa University, Italy
Lagoon Ecology and Aquaculture Laboratory
Orbetello Pesca Lagunare Company

Dr. Omid Gohardani

M.Sc. (Computer Science), FICCT, U.S.A.
Email: yogita@computerresearch.org

Dr. Yap Yee Jiun

B.Sc.(Manchester), Ph.D.(Brunel), M.Inst.P.(UK)
Institute of Mathematical Sciences,
University of Malaya,
Kuala Lumpur, Malaysia

Dr. Thomas Wischgoll

Computer Science and Engineering,
Wright State University, Dayton, Ohio
B.S., M.S., Ph.D.
(University of Kaiserslautern)
Web:avida.cs.wright.edu/personal/wischgol/index_eng.html

Dr. Baziotis Ioannis

Ph.D. in Petrology-Geochemistry-Mineralogy
Lipson, Athens, Greece

Dr. Xiaohong He

Professor of International Business
University of Quinnipiac
BS, Jilin Institute of Technology; MA, MS, Ph.D,
(University of Texas-Dallas)
Web: quinnipiac.edu/x1606.xml

Dr. Burcin Becerik-Gerber

University of Southern Californi
Ph.D in Civil Engineering
DDes from Harvard University
M.S. from University of California, Berkeley
M.S. from Istanbul Technical University
Web: i-lab.usc.edu

Dr. Söhnke M. Bartram

Department of Accounting and Finance
Lancaster University Management School
Ph.D. (WHU Koblenz)
MBA/BBA (University of Saarbrücken)
Web: lancs.ac.uk/staff/bartras1/

Dr. Söhnke M. Bartram

Ph.D, (IT) in Faculty of Engg. & Tech.
Professor & Head,
Dept. of ISE at NMAM Institute of Technology

Dr. Balasubramani R

Department of Accounting and Finance
Lancaster University Management School
Ph.D. (WHU Koblenz)
MBA/BBA (University of Saarbrücken)
Web: lancs.ac.uk/staff/bartras1/

M. Meguellati

Department of Electronics,
University of Batna, Batna 05000, Algeria

Dr. T. David A. Forbes

Associate Professor and Range Nutritionist
Ph.D Edinburgh University - Animal Nutrition
M.S. Aberdeen University - Animal Nutrition
B.A. University of Dublin- Zoology.
Web: essm.tamu.edu/people-info/faculty/forbes-david

Dr. Bassey Benjamin Esu

B.Sc. Marketing; MBA Marketing; Ph.D Marketing
Lecturer, Department of Marketing, University of Calabar
Tourism Consultant, Cross River State Tourism
Development Department
Co-rdinator , Sustainable Tourism Initiative, Calabar,
Nigeria

Dr. Maciej Gucma

Asistant Professor,
Maritime University of Szczecin Szczecin, Poland
Ph.D. Eng. Master Mariner
Web: www.mendeley.com/profiles/maciej-gucma/

Dr. Shun-Chung Lee

Department of Resources Engineering,
National Cheng Kung University, Taiwan

Dr. Fotini Labropulu

Mathematics - Luther College, University of Regina
Ph.D, M.Sc. in Mathematics
B.A. (Honours) in Mathematics, University of Windsor
Web: luthercollege.edu/Default.aspx

Dr. Vesna Stanković Pejnović

Ph. D. Philosopohy , Zagreb, Croatia
Rusveltova, Skopje, Macedonia

Dr. Miguel Angel Ariño

Professor of Decision Sciences
IESE Business School
Barcelona, Spain (Universidad de Navarra)
CEIBS (China Europe International Business School).
Beijing, Shanghai and Shenzhen
Ph.D. in Mathematics, University of Barcelona
BA in Mathematics (Licenciatura)
University of Barcelona
Web: web.iese.edu/MAArino/overview.axd

Dr. Philip G. Moscoso

Technology and Operations Management
IESE Business School, University of Navarra
Ph.D in Industrial Engineering and Management,
ETH Zurich , M.Sc. in Chemical Engineering,
ETH Zurich Link: Philip G. Moscoso personal webpage

Dr. Mihaly Mezei

Associate Professor
Department of Structural and Chemical Biology
Mount Sinai School of Medical Center
Ph.D., Eötvös Loránd University, Postdoctoral Training,
New York University, MSSM home:
<https://www.mountsinai.org/Find%20A%20Faculty/profile.do?id=0000072500001497192632>
Lab home - software,
publications: <https://inka.mssm.edu/~mezei>
Department: <https://atlas.physbio.mssm.edu>

Dr. Vivek Dubey (HON.)

MS (Industrial Engineering),
MS (Mechanical Engineering)
University of Wisconsin
FICCT
Editor-in-Chief, USA

Dr. Carlos García Pont

Associate Professor of Marketing
IESE Business School, University of Navarra
Doctor of Philosophy (Management),
Massachusetts Institute of Technology (MIT)
Master in Business Administration, IESE,
University of Navarra
Degree in Industrial Engineering,
Universitat Politècnica de Catalunya
Web: iese.edu/aplicaciones/faculty/facultyDetail.asp

Dr. Sanjay Dixit, M.D.

Director, EP Laboratories, Philadelphia VA Medical Center
Cardiovascular Medicine - Cardiac Arrhythmia
University of Penn School of Medicine
Web: pennmedicine.org/wagform/MainPage.aspx?

Dr. Pina C. Sanelli

Associate Professor of Radiology
Associate Professor of Public Health
Weill Cornell Medical College
Associate Attending Radiologist
New York-Presbyterian Hospital
MRI, MRA, CT, and CTA
Neuroradiology and Diagnostic Radiology
M.D., State University of New York at Buffalo,
School of Medicine and Biomedical Sciences
Web: weillcornell.org/pinasanelli/

Er. Suyog Dixit

(M.Tech), BE (HONS. in CSE), FICCT
SAP Certified Consultant
CEO at IOSRD, GAOR OSS
Technical Dean, Global Journals Inc.(US)
Website: www.suyogdixit.com
Email: suyog@suyogdixit.com

Er. Pritesh Rajvaidya

Computer Science Department
California State University
BE (Computer Science), FICCT
Technical Dean, USA
Email: pritesh@computerresearch.org,
deanusa@globaljournals.org

Dr. Apostolos Ch. Zarros

DM, Degree (Ptychio) holder in Medicine,
National and Kapodistrian University of Athens
MRes, Master of Research in Molecular Functions in
Disease,
University of Glasgow
FRNS, Fellow, Royal Numismatic Society
Member, European Society for Neurochemistry
Member, Royal Institute of Philosophy
Scotland, United Kingdom

Dr. Han-Xiang Deng

MD., Ph.D
Associate Professor and Research Department
Division of Neuromuscular Medicine
Davee Department of Neurology and Clinical
Neurosciences
Northwestern University Feinberg School of Medicine
Web: neurology.northwestern.edu/faculty/deng.html

Dr. Roberto Sanchez

Associate Professor
Department of Structural and Chemical Biology
Mount Sinai School of Medicine
Ph.D., The Rockefeller University
Web: mountsinai.org/

Jixin Zhong

Department of Medicine,
Affiliated Hospital of Guangdong Medical College,
Zhanjiang, China Davis Heart and Lung Research Institute,
The Ohio State University, Columbus, OH 43210, USA

Dr. Wen-Yih Sun

Professor of Earth and Atmospheric Sciences
Purdue University, Director
National Center for Typhoon and Flooding Research,
Taiwan
University Chair Professor
Department of Atmospheric Sciences,
National Central University, Chung-Li, Taiwan
University Chair Professor
Institute of Environmental Engineering,
National Chiao Tung University, Hsin-chu, Taiwan.
Ph.D., MS The University of Chicago, Geophysical Sciences
BS National Taiwan University, Atmospheric Sciences
Web: event.nchc.org.tw/2009

Dr. Michael R. Rudnick

M.D., FACP
Associate Professor of Medicine
Chief, Renal Electrolyte and Hypertension Division (PMC)
Penn Medicine, University of Pennsylvania
Presbyterian Medical Center, Philadelphia
Nephrology and Internal Medicine
Certified by the American Board of Internal Medicine
Web: uphs.upenn.edu/

Dr. Aziz M. Barbar, Ph.D.

IEEE Senior Member
Chairperson, Department of Computer Science
AUST - American University of Science & Technology
Alfred Naccash Avenue - Ashrafieh

Dr. Minghua He

Department of Civil Engineering
Tsinghua University
Beijing, 100084, China

Anis Bey

Dept. of Comput. Sci.,
Badji Mokhtar-Annaba Univ.,
Annaba, Algeria

Chutisant Kerdvibulvech

Dept. of Inf.& Commun. Technol.,
Rangsit University, Pathum Thani, Thailand
Chulalongkorn University, Thailand
Keio University, Tokyo, Japan

Dr. Wael Abdullah

Elhelece Lecturer of Chemistry,
Faculty of science, Gazan Univeristy,
KSA. Ph. D. in Inorganic Chemistry,
Faculty of Science, Tanta University, Egypt

Yaping Ren

School of Statistics and Mathematics
Yunnan University of Finance and Economics
Kunming 650221, China

Ye Tian

The Pennsylvania State University
121 Electrical Engineering East
University Park, PA 16802, USA

Dr. Diego González-Aguilera

Ph.D. Dep. Cartographic and Land Engineering,
University of Salamanca, Ávila, Spain

Dr. Maciej Gucma

PhD. Eng. Master Mariner
Warsaw University of Technology
Maritime University of Szczecin
Waly Chrobrego 1/2 70-500 Szczecin, Poland

Dr. Tao Yang

Ph.D, Ohio State University
M.S. Kansas State University
B.E. Zhejiang University

Dr. Feng Feng

Boston University
Microbiology, 72 East Concord Street R702
Duke University
United States of America

Shengbing Deng

Departamento de Ingeniería Matemática,
Universidad de Chile.
Facultad de Ciencias Físicas y Matemáticas.
Blanco Encalada 2120, piso 4.
Casilla 170-3. Correo 3. - Santiago, Chile

Claudio Cuevas

Department of Mathematics
Universidade Federal de Pernambuco
Recife PE Brazil

Dr. Alis Puteh

Ph.D. (Edu.Policy) UUM
Sintok, Kedah, Malaysia
M.Ed (Curr. & Inst.), University of Houston, USA

Dr. R.K. Dixit(HON.)

M.Sc., Ph.D., FICCT Chief Author, India
Email: authorind@globaljournals.org

Dr. Dodi Irawanto

PhD, M.Com, B.Econ Hons.
Department of Management,
Faculty of Economics and Business, Brawijaya University
Malang, Indonesia

Ivona Vrdoljak Raguz

University of Dubrovnik, Head,
Department of Economics and Business Economics,
Croatia

Dr. Prof Adrian Armstrong

BSc Geography, LSE, 1970
PhD Geography (Geomorphology)
Kings College London 1980
Ordained Priest, Church of England 1988
Taunton, Somerset, United Kingdom

Thierry FEUILLET

Géolittomer – LETG UMR 6554 CNRS
(Université de Nantes)
Institut de Géographie et d'Aménagement
Régional de l'Université de Nantes.
Chemin de la Censive du Tertre – BP, Rodez

Dr. Yongbing Jiao

Ph.D. of Marketing
School of Economics & Management
Ningbo University of Technology
Zhejiang Province, P. R. China

Cosimo Magazzino

Roma Tre University
Rome, 00145, Italy

Dr. Shaoping Xiao

BS, MS, Ph.D Mechanical Engineering,
Northwestern University
The University of Iowa
Department of Mechanical and Industrial Engineering
Center for Computer-Aided Design

Dr. Alex W. Dawotola

Hydraulic Engineering Section,
Delft University of Technology,
Stevinweg, Delft, Netherlands

Dr. Luisa dall'Acqua

PhD in Sociology (Decisional Risk sector),
Master MU2, College Teacher in Philosophy (Italy),
Edu-Research Group, Zürich/Lugano

Xianghong Qi

University of Tennessee
Oak Ridge National Laboratory
Center for Molecular Biophysics
Oak Ridge National Laboratory
Knoxville, TN 37922, United States

Gerard G. Dumancas

Postdoctoral Research Fellow,
Arthritis and Clinical Immunology Research Program,
Oklahoma Medical Research Foundation
Oklahoma City, OK
United States

Vladimir Burtman

Research Scientist
The University of Utah, Geophysics
Frederick Albert Sutton Building, 115 S 1460 E Room 383
Salt Lake City, UT 84112, USA

Jalal Kafashan

Mechanical Engineering, Division of Mechatronics
KU Leuven, BELGIUM

Zhibin Lin

Center for Infrastructure Engineering Studies
Missouri University of Science and Technology
ERL, 500 W. 16th St. Rolla,
Missouri 65409, USA

Dr. Lzzet Yavuz

MSc, PhD, D Ped Dent.
Associate Professor,
Pediatric Dentistry Faculty of Dentistry,
University of Dicle, Diyarbakir, Turkey

Prof. Dr. Eman M. Gouda

Biochemistry Department,
Faculty of Veterinary Medicine, Cairo University,
Giza, Egypt

Della Ata

BS in Biological Sciences
MA in Regional Economics
Hospital Pharmacy
Pharmacy Technician Educator

Dr. Muhammad Hassan Raza, PhD

Engineering Mathematics
Internetworking Engineering, Dalhousie University,
Canada

Dr. Asunción López-Varela

BA, MA (Hons), Ph.D (Hons)
Facultad de Filología.
Universidad Complutense Madrid
29040 Madrid, Spain

Dr. Bondage Devanand Dhondiram

Ph.D
No. 8, Alley 2, Lane 9, Hongdao station,
Xizhi district, New Taipei city 221, Taiwan (ROC)

Dr. Latifa Oubedda

National School of Applied Sciences,
University Ibn Zohr, Agadir, Morocco
Lotissement Elkhier N°66
Bettana Salé Maroc

Dr. Hai-Linh Tran

PhD in Biological Engineering
Department of Biological Engineering
College of Engineering Inha University, Incheon, Korea

CONTENTS OF THE ISSUE

- i. Copyright Notice
 - ii. Editorial Board Members
 - iii. Chief Author and Dean
 - iv. Contents of the Issue
-
- 1. Automatic Gait Recognition using Hybrid Neural Network. *1-4*
 - 2. Application and Performance Analysis of DSDV Routing Protocol in Ad-Hoc Wireless Sensor Network with Help of NS2 Knowledge. *5-14*
 - 3. The Components that can Build Flexible & Efficient Software Defined Network. *15-18*
 - 4. A New Networks Intrusion Detection Architecture based on Neural Networks. *19-27*
-
- v. Fellows
 - vi. Auxiliary Memberships
 - vii. Process of Submission of Research Paper
 - viii. Preferred Author Guidelines
 - ix. Index



GLOBAL JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY: E
NETWORK, WEB & SECURITY
Volume 17 Issue 1 Version 1.0 Year 2017
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Automatic Gait Recognition using Hybrid Neural Network

By Drishty & Jasmeen Gil

Abstract- Gait is a biometric trait that has been used for user authentication or verification on the basis of various attributes of gait. Gait of an individual get affected due to variation in mood, emotions, age and weight, due to these variation a perfect model is not possible that can be developed so that these all factors can be eliminated. In the proposed work, CASIA dataset has been used as standard dataset. This dataset contains samples of 16 different individuals that have been taken at 0, 45, 90 degrees of angles. Afterwards, silhouette images have been taken for feature extraction from the gait samples using variable2-dimenssionl principal component analysis with neural network classifier.

Keywords: gait recognition, VI-2DPCA, FAR, FRR.

GJCST-E Classification: F.1.1



Strictly as per the compliance and regulations of:



Automatic Gait Recognition using Hybrid Neural Network

Drishty ^α & Jasmeen Gil ^σ

Abstract- Gait is a biometric trait that has been used for user authentication or verification on the basis of various attributes of gait. Gait of an individual get affected due to variation in mood, emotions, age and weight, due to these variation a perfect model is not possible that can be developed so that these all factors can be eliminated. In the proposed work, CASIA dataset has been used as standard dataset. This dataset contains samples of 16 different individuals that have been taken at 0, 45, 90 degrees of angles. Afterwards, silhouette images have been taken for feature extraction from the gait samples using variable2-dimenssiaoal principal component analysis with neural network classifier.

Along with this, validation of the proposed work has been done using two performance evaluation parameters, namely, FAR and FRR through confusion matrix.

Keywords: gait recognition, VI-2DPCA, FAR, FRR.

1. INTRODUCTION

a) Gait Recognition

Gait recognition is a developing biometric innovation which includes individuals being distinguished absolutely through the investigation of the way they walk. While exploration is still in progress, it has pulled in enthusiasm as a technique for recognizable proof on the grounds that it is non-obtrusive and does not oblige the subject's collaboration. Step distinguishment could likewise be utilized from a separation, making it appropriate to recognizing culprits at a wrongdoing scene. Yet stride distinguishment innovation is not restricted to security applications –analysts additionally imagine medicinal applications for the innovation. For instance, perceiving changes in strolling examples right off the bat can help to recognize conditions, for example, Parkinson's infection and numerous sclerosis in their most punctual stages.

b) Types of Gait Reorganization

i. Automatic analysis of video imagery

This is the all the more generally examined and endeavored of the two. Feature examples of the subject's walk are taken and the directions of the joints and edges over the long haul are examined. A numerical model of the movement is made, and is therefore looked at against whatever other examples to focus their character.

ii. Radar system

This is utilized by cops to recognize speeding autos. The radar records the step cycle that the different body parts of the subject make as he or she strolls. This information is then contrasted with different examples to distinguish them.

Endeavors are being made to make stride distinguishment as exact and usable as would be prudent, keeping in mind it might never be as solid as different biometrics, for example, unique mark or iris distinguishment, it is anticipated that walk distinguishment innovation will be discharged in a useful state inside the following five years, and will be utilized as a part of conjunction with different biometrics as a technique for ID and verification.

c) Gait Cycle

A Gait Cycle is the time period or succession of occasions or developments amid motion in which one foot contacts the ground to when that same foot again contacts the ground, and includes forward impetus of the inside of gravity of human body comprising exchange crooked snippets of distinctive fragments of the body with minimum consumption of vitality. A solitary step cycle is otherwise called a stride.

i. Phases of Gait Cycle

- Stance Phase, the phase during which the foot remains in contact with the ground.
- Swing Phase, the phase during which the foot is not in contact with the ground.

A more detailed classification of gait recognizes six phase.

1. Heel Strike
2. Foot Flat
3. Mid-Stance
4. Heel-Off
5. Toe-Off

ii. Components of Gait Cycle

Stance Phase: The stance stage is that piece of a walk cycle amid which the foot stays in contact with the ground. For investigating walk cycle one foot is taken as reference and the developments of the reference foot are contemplated. It constitutes of 60 percent of the step cycle. In stance stage the reference foot experiences five developments.

- Initial Contact (Heel Strike): In initial contact, the heel is the first bone of the reference foot to touch the ground.

Author α: Research Scholar at RIMT, Mandi Gobindgarh.

e-mail: jolly_drishty@yahoo.com

Author σ: Assistant Professor at RIMT-IET, Mandi Gobindgarh.

e-mail: er.jasmeengill@gmail.com

- Loading Response(Foot Flat):In loading response phase, the weight is transferred onto the referenced leg. It is important for weight-bearing, shock-absorption and forward progression.
- Mid Stance: It involves alignment and balancing of body weight on the reference foot.
- Terminal Stance: In this phase the heel of reference foot rises while the its toe is still in contact with the ground.
- Toe Off (Pre Swing): In this phase, the toe of reference foot rises and swings in air. This is the beginning of the swing phase of the gait cycle.

II. PROBLEM FORMULATION

From the last few decades, technology has been increased day by day but some problems are still there to be solved such as to recognize an individual by his/her walk perfectly.

Nowadays, automated visual surveillance has been under a big interest. This is mainly due to the vital purpose to provide a safe environment. In result there is a rapid increase in synchronized closed-circuit television (CCTV) cameras, which require an intelligent approach. Thus, these ideal systems should be able to recognize the identity of the subject if they detect a suspicious behavior. Basically, such systems, having monitored the process, should be able to give a warning before the actual event happens, and be able to identify the subject from the crowd immediately. The gait recognition is the most suitable biometric measure for these reasons. Also its unobtrusiveness feature that does not require observed subjects' cooperation makes gait recognition more attractive to study for security reasons. Thus, the gait recognition will be a very useful and powerful tool to identify perpetrators. Apart from this, it is not limited to security applications, a lot of medical applications are based on this technique. For example, the main objective in medicine linked with gate is to identify walking conditions to treat pathologically abnormal patience, to identify different neuromuscular disorders, such as multiple sclerosis and Parkinson's disease, in their early stage. Moreover, gait analysis is in wide use in sports biomechanics applications. It helps people involved in sports to improve performance and reduce injury risks by tracking the walking and running process and identifying posture or movement-related problems that might occur. Also, research on gait recognition is a very challenging task, as there are different gait covariates and variations that can affect the performance of data which depend upon some factors such as mood of a person, fast/slow walk, shoe type, tight/loose cloth etc.

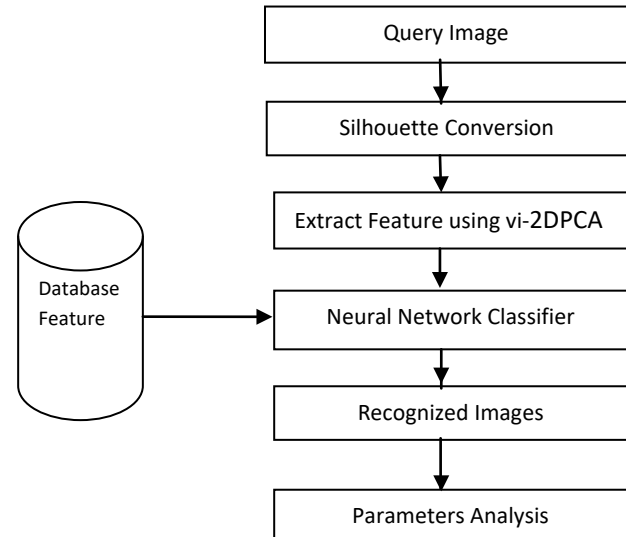
So, there is a need of automatic gait recognition system which will help to solve such issues.

Hence, the motivation of this research work is to develop an automatic gait recognition system which will be based on vi-2DPCA and neural networks.

III. METHODOLOGY

In the process of Gait Recognition, different gait dataset has been used for Gait Recognition process. CASIA-A dataset has been used that contain 16 different persons samples with left and right gait samples with different angles that are 0° , 45° and 90° .

In this research work, training and testing gait samples has been used for Gait Recognition.



Step1. In this processing, different frames from video has been extracted and these frames have been used for silhouette conversion by removing back ground from the frames of the video and these frames have been used for silhouette conversion by removing back ground from the frames of the video.

Step2. After silhouette conversion, the region area boundaries have been computed from silhouette samples.

Step3. After computing the left and right region from the gait sample, the Variable Two Dimensional Principal Component Analysis (V 2-DPCA) has been implemented so that feature matrix from a particular gait cycle can be computed.V2DPCA is used for feature calculation that uses a variable factor with Eigen values of the feature matrix where feature matrix has been computed for different gait cycles.

Step4. Neural network classifier is used to Weightings are applied to the signals passing from one unit to another, and it is these weightings which are tuned in the training phase to adapt a neural network to the particular problem at hand. This is the learning phase. Neural networks have found application in a wide variety of problems. After loading the Training set and testing samples, processing of Training samples and Testing samples is performed.

Gait Recognition using vi-2DPCA and Artificial Neural Networks with the existing system i.e. fuzzy logic based model, and then analyze parameter accuracy for FAR & FRR parameters as a performance matrices for the performance evaluation.

Finally, Recognized sample is obtained.

IV. RESULTS AND DISCUSSIONS

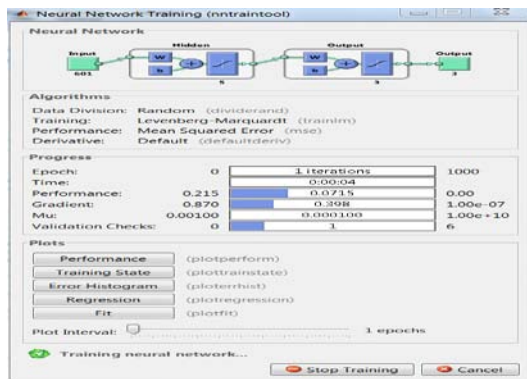


Figure 5.1: GUI for Accuracy Computation of Gait Recognition System

Figure 5.1 represents the Graphic User Interface designed to the accuracy computation of Gait Recognition System. The various buttons, axes and popup menus have been used for designing of the final work.

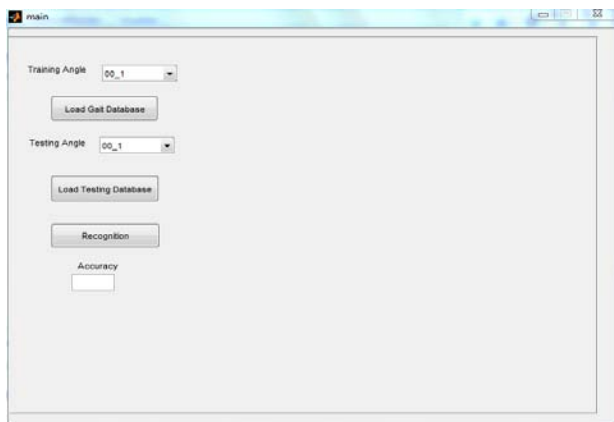


Figure 5.2: Training angel & testing angle

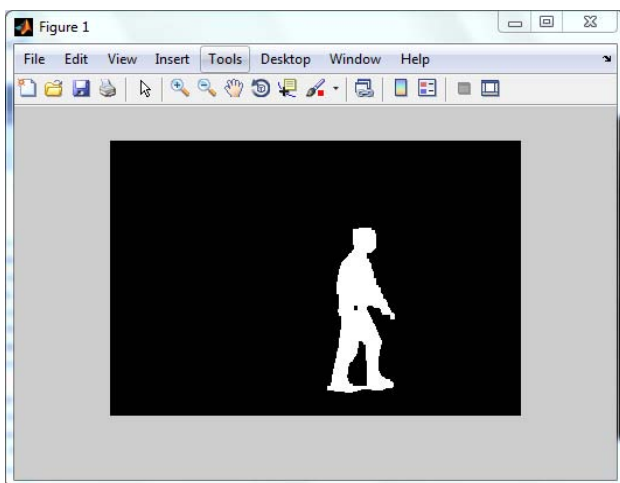


Figure 5.3: Accuracy computation for different training and testing features

Figure 5.3 represents the accuracy computation for different training and testing features. In this thesis work, the accuracy has been measured at 0° , 45° and 90° angles of gait. In the Gait Recognition, different angles data has been used for Gait Recognition. The samples have been used for training of Gait Recognition system and features have been computed. After this, testing samples of same angles has been used for Gait Recognition and the accuracy of final work has to be computed.



Figure 5.4: Representation of Gait Cycle at 45° angle



Figure 5.5: Representation of Gait Cycle at 90° angle

All the above figures represent gait samples at 0° , 45° and 90° . These samples have been taken at different time instances. The 4 samples are available for each degree angle. In the above figures, the gait cycle changes due to variation in the angles.

Table 5.1 Parameters Table for Final System

Gait angle	FAR	FRR	Accuracy rate of proposed system	Accuracy rate of existing system
0°	0%	2%	97.7 %	62.5 %
45°	14%	4%	86 %	50 %
90°	18%	20%	82%	62.5 %

Table 5.1 represents accuracy table for Gait Recognition System. On the basis of these parameters, performance of different approaches can be evaluated. These parameters are essential for performance evaluation of the final system.

V. CONCLUSION

In this paper, the gait of an individual is recognized through his walk with hybridization of techniques. Gait of an individual get affected due to variation in mood, emotions, age and weight, due to these variation a perfect model is not possible that can be developed so that these all factors can be eliminated. The present research works on the development of an automatic gait recognition system that can be used to provide better recognition accuracy under different circumstances. In the proposed work, CASIA dataset has been used as standard dataset. This dataset contains samples of 16 different individuals that have been taken at 0, 45, 90 degrees of angles. Afterwards, silhouette images have been taken for feature extraction from the gait samples. Gait samples have been loaded to the system and features have been computed using variable2-dimenssiao1 principal component analysis. These approaches compute the covariance matrix and mean matrix from the image sample and the features have been computed from these gait sample. These features have been taken as input to the neural networks for recognition. In the neural network architecture, 5 hidden layers have been used for generation and movement of weight age to different samples. These neurons have been used to classify different samples in different classes so that recognition of gait samples can be easily done.

On the basis of these parameters and techniques it is concluded that this work has been proposed for future work. Hence, the automated gait recognition using hybrid neural network can be used as a biometric recognition applications.

REFERENCES RÉFÉRENCES REFERENCIAS

1. ShirkeS., Pawar S.and Shah K.(2014) "Litera- ture Review: Model Free Human Gait Recognition", Fourth International Conference on Communication Systems and Network Techn- ologies (CSNT),s pp. 891 – 895.
2. Muramatsu D Shiraishi A. Makihara Y. and Uddi M.Z (2014) "Gait-Based Person Recognition Using Arbitrary View Transformation Model", IEEE Transac- tion on Image Processing, vol.24, pp.140-154.
3. Zhang H.,Qian J., Shen L. and Zhang Y. (2012) "Research on Healthy Subject Gait Cycle Phase at Different Walking Speeds", IEEE International Conference on Robotics and Biomimetics, pp. 1349- 1354.
4. Amirzhanova A., (2014) "Human Identification thro- ugh Gait Recognition", IEEE Conf. on Gait Recog- nition, pp 5.
5. Singh D. and Dixit A., (2014) "Human identify- cation using gait recognition technique with PAL and PAL entropy, SVM and k-means with LDA", International Journal of Computer Science and Information Tech- nologies, Vol. 5 (6), pp 5.
6. Tafazzoli F., Bebis G.,Louis S. and Hussain M. (2014) "Improving human gait recognition using feature selection", ISVC Part II, LNCS 8888, pp 5-6.
7. Kaur N. and Singh S. (2014) "Review on: gait reco- gnition for human identification using NN", Interna- tional Journal of Computer Science and Information Technologies, Vol. 5 (3), pp 6-7.
8. Hongye X. and Zhuoya H. (2015) "Gait recognition based on gait energy image and linear discriminant analysis", IEEE, pp 7.
9. Tafazzoli F., Bebis G., Louis S. and Hussain M. (2015) "Genetic feature selection for gait recogni- tion", Journal of electronic imaging 24(1), pp 7.
10. Agostini V.,(2014)"Segmentation and Classification of Gait Cycles", International conf. on Neural Sys- tems and Rehabilitation Engineering, IEEE.
11. Yang J., Xu Y. and Yang J., (2010) "Bi-2DPCA: A Fast Face Coding Method for Recognition", Interna- tional conference on Pattern Recognition Recent Advances, DOI htt p://cdn. Intech- web- org/ pdfs/ 10663.pdf
12. Soni S. and Sahu R.K. (2013) "Face recognition ba- sed on 2DPCA and result comparison with different classifiers", International Journal of Advanced Rese- arch in Computer and Communication Engineering Vol. 2, Issue 10.
13. Kamavisdar P., Saluja S. and Agrawal S. (2013) "A Survey on Image Classification Approaches and Techniques", International Journal of Advanced Research in Computer and Communication Engine- ering Vol. 2, Issue 1.
14. Islam M.S., Matin A. and Rokanujjaman M. (2014) "A new effective part selection approach for part- based gait recognition", IEEE International Confere- nce on Computer and Information Technology, pp 181 – 184.
15. Purohit P.Z. and Sakle M. (2014) "Survey on Bio- metric Human Gait Recognition", International Jour- nal of Advanced Research in Comp- uter Science and Software Engineering, Vol. 4, Issue 11.
16. Joshi A., Bhushan S. and Kaur Jaspreet (2014) "Gait Recognition of human using SVM and BPNN classifiers", IJCSMC, Vol. 3, Issue 1, pp 281-290.
17. Kaur K. and Kaur P. (2016) "Gait Recognition system using V2dpca with manhattan distance clas- sifier", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 6, Issue 1, pp 210-216.



GLOBAL JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY: E
NETWORK, WEB & SECURITY
Volume 17 Issue 1 Version 1.0 Year 2017
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Application and Performance Analysis of DSDV Routing Protocol in Ad-Hoc Wireless Sensor Network with Help of NS2 Knowledge

By Mohammed Zaid Ghawy & Dr. Maher Ali AL - Sanabani

Thamar University

Abstract- Wireless Sensor Networks (WSNs) are characterized by multi-hop wireless connectivity, frequently changing network topology and need for efficient routing protocols. The purpose of this paper is to evaluate performance of routing protocol DSDV in wireless sensor network (WSN) scales regarding the End-to-End delay and throughput PDR with mobility factor. Routing protocols are a critical aspect to performance in mobile wireless networks and play crucial role in determining network performance in terms of packet delivery fraction, end-to-end delay and packet loss. Destination-sequenced distance vector (DSDV) protocol is a proactive protocol depending on routing tables which are maintained at each node. The routing protocol should detect and maintain optimal route(s) between source and destination nodes. In this paper, we present application of DSDV in WSN as extend to our pervious study to the design and impleme-ntation the details of the DSDV routing protocol in MANET using the ns-2 network simulator.

Keywords: DSDV; MANET, IEEE802, packet delivery, endtoend delay, packet loss, scalability, WSN wireless sensor network, NS2.34, LR-WPAN.

GJCST-E Classification: F.2.2, C.2.2



APPLICATION AND PERFORMANCE ANALYSIS OF DSDV ROUTING PROTOCOL IN AD-HOC WIRELESS SENSOR NETWORK WITH THE HELP OF NS2 KNOWLEDGE

Strictly as per the compliance and regulations of:



RESEARCH | DIVERSITY | ETHICS

Application and Performance Analysis of DSDV Routing Protocol in Ad-Hoc Wireless Sensor Network with Help of NS2 Knowledge

Mohammed Zaid Ghawy^α & Dr. Maher Ali AL - Sanabani^σ

Abstract- Wireless Sensor Networks (WSNs) are characterized by multi-hop wireless connectivity, frequently changing network topology and need for efficient routing protocols. The purpose of this paper is to evaluate performance of routing protocol DSDV in wireless sensor network (WSN) scales regarding the End-to-End delay and throughput PDR with mobility factor. Routing protocols are a critical aspect to performance in mobile wireless networks and play crucial role in determining network performance in terms of packet delivery fraction, end-to-end delay and packet loss. Destination-sequenced distance vector (DSDV) protocol is a proactive protocol depending on routing tables which are maintained at each node. The routing protocol should detect and maintain optimal route(s) between source and destination nodes. In this paper, we present application of DSDV in WSN as extend to our pervious study to the design and implemen- tation the details of the DSDV routing protocol in MANET using the ns-2 network simulator. also, the performance of DSDV protocol in sensor network of randomly distributed mobile nodes with mobile source and sink nodes is investigated for MAC IEEE802.15.4 network by ns-2 simulator.

Keywords: DSDV; MANET, IEEE802, packet delivery, end-to-end delay, packet loss, scalability, WSN wireless sensor network, NS2.34, LR-WPAN.

I. INTRODUCTION

Wireless Sensor Network (WSN) thus consists of tiny sensor nodes communicating with each other, and deployed from small to large scales. The existing wireless technology is based at the point-to-point technology. This kind of network is used in areas such as environmental monitoring or in rescue operations. Wireless systems, both mobile and fixed, have become an indispensable part of communication infrastructure. Their applications range from simple wireless low data rate transmitting sensors to high data rate real-time systems such as those used for monitoring large retail outlets[1].

The destination-sequenced distance vector (DSDV) routing protocol is a proactive routing protocol which adds a new attribute, sequence number, to each route table entry at each node. Routing table is maintained at

each node and with this table; node transmits the packets to other nodes in the network. This protocol was motivated for the use of data exchange along changing and arbitrary paths of interconnection which may not be close to any base station. The motivation for choosing a DSDV routing protocol for our research comes from the fact that many routing protocols are based on DSDV such as AODV [3]. In addition, several routing protocols have been proposed [4], [5], [6], [7], [8], [9], [10], [11], [12] to improve the performance of DSDV. DSDV routing protocols are considered more reliable and robust. Furthermore, in DSDV protocol, whenever a link failure is detected in a primary route, the source node can select the best route. This mechanism enhances route availability and consequently reduces control overhead, saves energy, enhances data transmission rate, and increases the network throughput.

For these reasons, proactive DSDV routing protocol is useful for the use to many applications in MANETs of data exchange along changing and arbitrary paths of interconnection without need to any base station and achieve high quality of service (QoS) in terms of packet delivery ratio and end-to-end (E2E) delay to support multimedia applications over MANETs, such as real-time traffic as visitor tracking sensor, load balancing. Some real time applications required DSDV protocol behavior such as Follow me, Multimedia guide book, Visitor tracking, Sensor network IEEE 802.15.4 LR-WPAN.

The primary objective of this article are: Firstly, evaluating the performance of DSDV in WSN as extend to our pervious study that it analyses performance, design and implementation in details of the DSDV routing protocol in MANET as in [2] using the ns-2 network simulator. Where what are we presenting in this paper it was not applied in [2]. So, The performance metrics evaluated in terms different network metrics such as, number of nodes and network dynamicity in terms of node speed and pause time. Secondly, the application of DSDV we envisaged is called the monitor sensor system – involved tracking the approximate location of several mobile nodes in a small building, and feed information on location and direction of each node to a single central sink. It was required that the user at the central sink receive alerts if any mobile node approached restricted areas within the building. However, the DSDV protocol is a

Author α: Department of Computer Science Faculty of Computer Science and Information Technology Thamar University T thamar, Republic of Yemen. e-mail: mohammdghawi@gmail.com

Author σ: Department of Computer Science Faculty of Computer Science and Information Technology Thamar University T thamar, Republic of Yemen. e-mail: m.sanabani@gmail.com

proactive protocol, and for this reason, the DSDV routing protocol was used to communicate nodes location information to the sink node. Thirdly, the application's performance achieved by analyzes and evaluate of DSDV protocol in terms of throughput, delay and packet delivery ratio. The problems that DSDV faced in this application presented.

The rest of the paper is organized as follows: Section 2 begins with knowledge information about some the applications of DSDV in different approach. Section 3 presents the following methodology and procedures of previous and current our study. Section 4 discusses of tools and the simulation environment. Section 5 describes Network Topology and Device Architecture in a LR-WPAN and scenarios. Section 6 and Section 7 describes the simulation parameter used to analysis and running of program in ns2. Section 8 discuss the results, evaluates the performance of DSDV protocol. The paper is concluded along with future works directions in section 9.

II. APPLICATION OF DSDV PROTOCOL IN WSN

Potential WSN applications include security, traffic control, industrial and manufacturing automation, medical or animal monitoring [13]. The WSN nodes can also be used to monitor dangerous or inaccessible environments, such as volcanoes, toxic regions, the deep ocean or the lunar surface. These small nodes can be fixed, mobile or move together with the observed phenomenon (e.g. sensing animal movements or hurricanes).

The purpose of this paper is to evaluate DSDV routing protocol in wireless sensor network (WSN) as Wireless Personal Area Networks (WPAN) scales regarding the packet delivery ratio, the average end-to-end delay and throughput and other parameter is will presented as list as will we see. However, many Ad hoc routing protocols are proposed for WSNs due to their quick and economically less demanding deployment. DSDV and AODV are good examples of Ad hoc protocols that are proposed and implemented in WSNs [14].

a) Applications DSDV routing protocol in MANET

There are however sensor applications that are designed with mobile ad-hoc routing protocols. Destination Sequenced Distance Vector (DSDV) is a candidate routing algorithm for many sensor applications like the "Follow me" application that guides visitors to the location of a building or an application to assist workers in finding conference rooms [15].

Both applications could be also used in outdoor sites such as archaeological sites, where no infrastructure exists. Another application of DSDV protocol is the Multimedia Guidebook [16], which is based on sensors communicating through an Ethernet to provide multimedia information via Bluetooth to the user's mobile device. If the Ethernet is substituted with a

wireless 802.11b network then the application can be deployed to outdoor archaeological and tourist sites, especially when the sites are expanding for areas of many km².

b) DSDV applications in Visitor Tracking System (VTS)

The application we envisaged-called the Visitor Tracking System-involved tracking the approximate location of several mobile nodes in a small building personal area, and feed information on location and direction of each node to a single central sinks. It was required that the user at the central sink receive alerts if any mobile node approached restricted areas within the building, from [17].

c) Sensor network IEEE.802.15.4 RL-WPAN

The IEEE 802.15.4 standard [18] defines the physical layer (PHY) and medium access control (MAC) sub-layer specifications for Low Rate - Wireless Personal Area Networks (LR-WPANs), low power consumption and low cost applications. The standard MAC protocol supports two operational modes, either beacon enabled or non beacon-enabled. When using a beacon, the transmission is based on super frames slotted CSMA-CA. For the non beacon mode, the messages will be directly transmitted in an unspotted CSMA-CA, from [19]. The IEEE 802.15.4 standard is being designed to be used in a wide variety of applications which require simple wireless communications over short-range distances with limited power and relaxed throughput needs. IEEE 802.15.4 facilitates Wireless Sensor Networks (WSNs) with the goal of reducing the installation cost of sensors and actuators while enabling sensor-rich environments.

III. METHODOLOGY

To achieve primary objectives, the following tasks must be done: Firstly, get a general understanding of MANETs, simulation environment that could be used for analyzing, evaluating and implementing MANETs' protocols, understanding DSDV source code to know how DSDV protocol mechanism. Then, analyze the protocol theoretically and through simulation based on above mentioned performance and network metrics. The research methodology used is simulation-based prototyping. That is, designed and implemented the routing protocol that extends the well-studied DSDV protocol. Then evaluation of protocol in life as WSN application. We revise the protocol based on these performance metrics to produce the final protocol DSDV. As in Fig 1, shows the research methodology used in this research and it taken from initial previous our study by Gawi in [2].

Simulation in general and the NS2 simulator in particular are widely used to evaluate network protocols. They have significant advantages over other methodologies such as direct experiments and mathematical modeling. A computer simulation is an application designed to mimic a real-life situation.

One of the advantages of simulators is that they are able to provide our with practical feedback when designing real world systems. Consequently, we as designers can determine the correctness and efficiency of a design before the system is actually constructed. The simulators permit our to study a problem at several different levels of abstraction. By approaching a system at a high level of abstraction, we can understand the behavior and interactions of all components of

this protocol, and is therefore better equipped to counter the system's complexity. One of the disadvantages of using a network simulator for testing a distributed application system from the fact that there is no real network involved in the simulation [2].

Indeed industry standard tools like NS2 have emerged to meet this need. This study follows this practice.

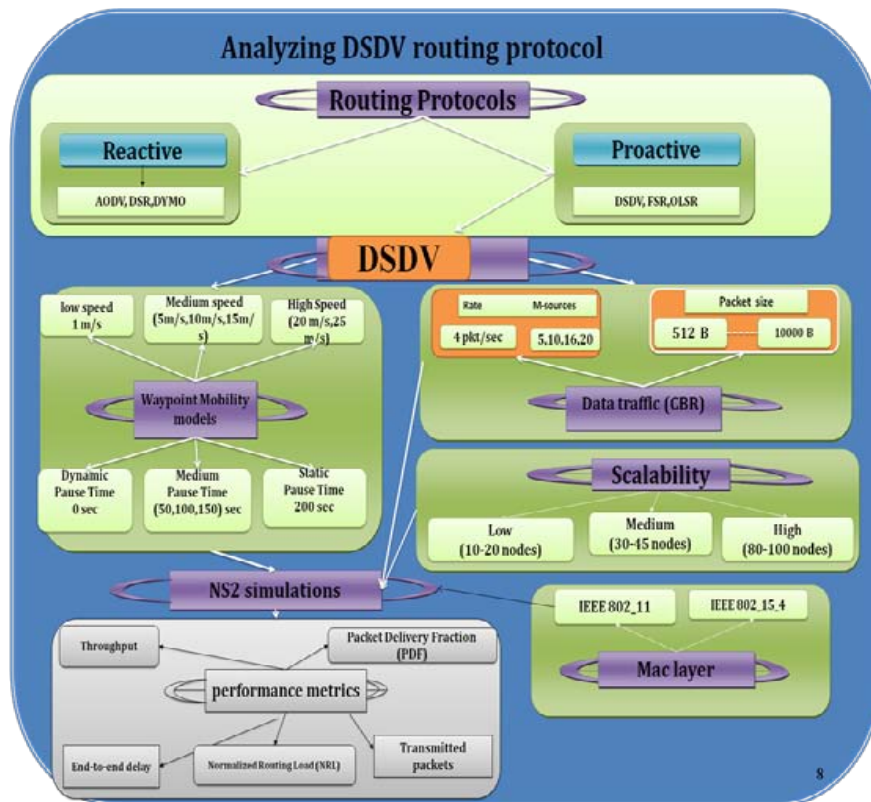


Figure 1: The analysis study and implementation study of DSDV in brief

IV. SIMULATION ENVIRONMENT

NS2.34 network simulator [20] is used to evaluate the proposed DSDV. The simulation scenario topology consisting of number of nodes and their connectivity and was created by topology generators GT-ITM [21].

The goal of our simulations in this paper is study and evaluation and measure the ability of DSDV routing protocol to react to multi-hop ad-hoc network topology changes with. IEEE 802.15.4 standard and comparison of performance metric based on following network metrics, number of nodes, pause time of mobile nodes movement, speed of nodes mobility. To run the simulation experiments, our basic methodology is to define a set of movement scenarios and communication patterns and apply them to MANET. In fact, testing with each data packet originated by a sender mobile node, whether the DSDV routing protocol is able to route and deliver it to the destination node.

a) Working environment

- Operating System: Ubuntu10.10 (Linux).
- Patch used: Mannasim [24] Patch with ns-allinone-2.34[20] for WSN simulation.
- NS version: ns-allinone-2.34.
- Various packages and scripts: NAM 1.14, Awk 3.1.6, tc18.4.18, Tracgraph 2.02,gnuplot 4.0.

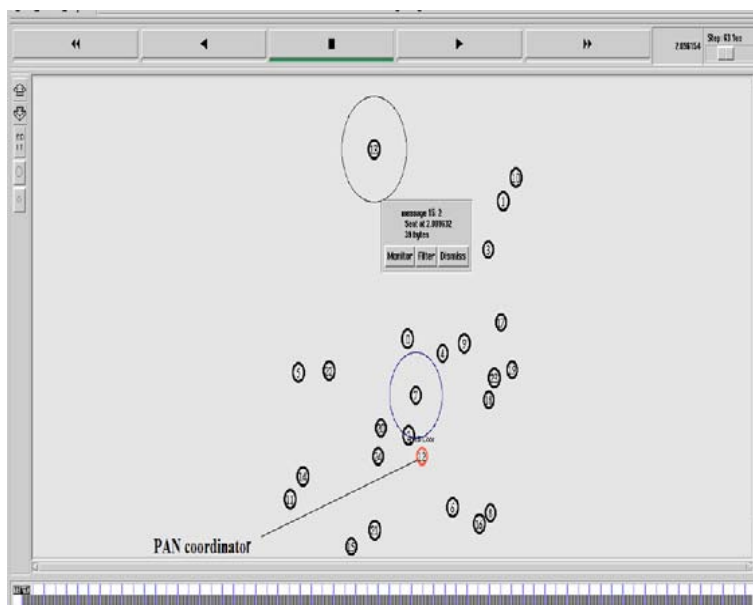


Figure 2: Initial nodes movements before the nodes associates with its coordinator at time 2 sec

V. NETWORK TOPOLOGY AND DEVICE ARCHITECTURE

Devices in a LR-WPAN scenario can be of 3 types, PAN Coordinator, full function device (FFD) or a reduced function device (RFD) [22]. Devices that participate are FFD or RFD. Each RFD can only associate with a single FFD at an instance whereas FFDs can communicate with other FFDs or RFDs. A FFD contains the complete set of MAC services and is able to operate as a network coordinator or a network device. On the contrary, a RFD is simply a network device with a reduced set of MAC services and usually used for simple applications. In fig. 2 with this topology, communication is established between devices by a single mobile controller known as the PAN coordinator (this is node 12 shown in scenario fig 2). The PAN coordinator (which is a FFD) acts as a hub that forms direct links to other devices. These devices, consisting of FFDs or RFDs, from around the PAN coordinator and act as data terminal locations (sensors). This topology simplifies routing and reduces direct links at the expense of data traffic latency.

In the scenario showed as in fig. 3, each node connected with the central coordinator considered secondary Coordinator for node farther out as well as this node if it succeeds in sync link with the secondary coordinator is like the farthest coordinator of the central coordinator. If node works in contact, they transmit information owned by other nodes and so are transfers information between the wish to reach even the central coordinator, which is regarded as the sink or destination for the entire network and the rest of the nodes is the source for the transfer of information

Because DSDV protocol is proactive any it cares greatly providing availability and keep topology of

network exposed to all node. All node have information about the location nodes other in network so this protocol does not require a delay is needed to rediscover the path to the target as long as it always update routing table .for This that DSDV useful so in such applications.

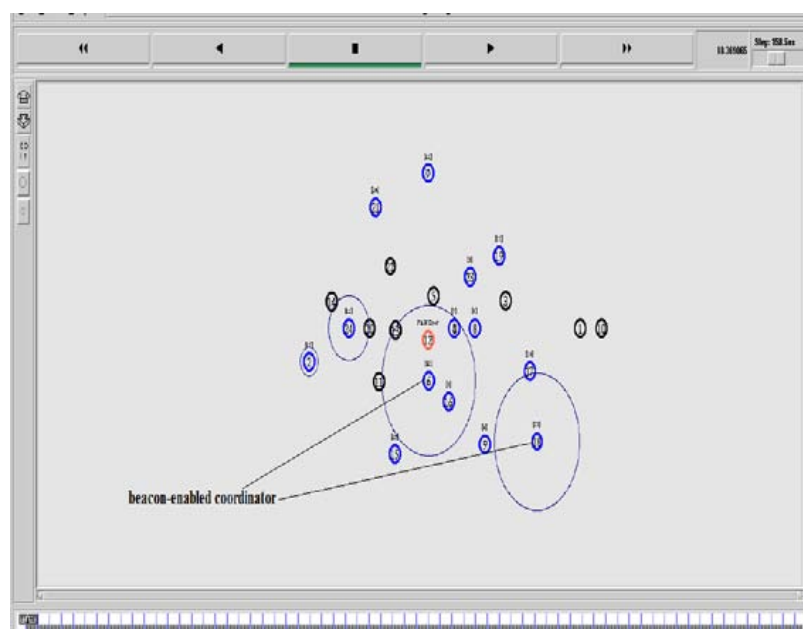


Figure 3: Movement after the node associates with its coordinator

The implementation of non beacon-enabled mode in mobile ad-hoc sensor networks is not suitable because the non beacon enabled mode does not send a beacon periodically, thus the node (node 11 as in fig 4) will assume its association is always preserved although it may have moved away from the coordinator and lost the link. If this happens, the moving node stops

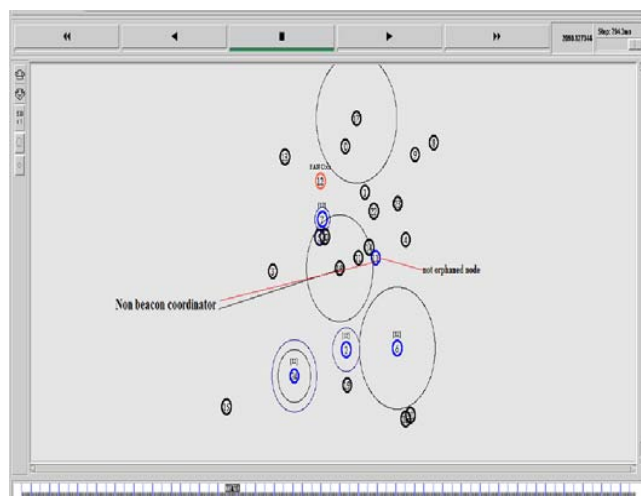


Figure 4: Fast moving lost synchronization

its attempt to associate with other coordinators because it does not consider itself an orphan node. Thus, it will be difficult for the nearest coordinator to detect this node. In this network the DSDV protocol in very good way periodically or incremental updates messages is transmitting between the nodes to maintain network topology as it theses the node moving in network area.

The flow of node association and synchronization is given in Fig. 5. The node starts association with an active scan procedure that scans all listed channels by sending beacon requests to all nearby coordinators.

All the information received in a beacon frame will be recorded in a PAN descriptor.

The results of the channel scan will be used to choose a suitable PAN. The node then sends a request to associate with the chosen coordinator. The node updates its current channel and PAN id while waiting for an acknowledgement from the coordinator. Upon receiving an acknowledgement, the node then waits for the association results. The coordinator will determine whether the current resources are available on the PAN in order to allow the node to associate. If sufficient resources are available, the coordinator then allocates a short address to the node and sends an association response command containing a new address and a status indicating a successful association[19]. If there are not sufficient resources, the node will receive an association response command with a failure status.

VI. PERFORMANCE ANALYSIS

In practice, node movements in the PAN will result in the network having to re-learn new routes. Several experiments are conducted to analyze and evaluation the behavioral response of DSDV in the Mac/IEEE 802.15.4 network. The DSDV protocol presents a stability at the power consumption as it has a mechanism of finding a valid route by using a technical which exchanges routing messages between nearby mobile nodes. Essentially, the influence of mobility, dropped packets by node and network loading on the network will be considered. In particular, the network's packet delivery ratio, delay and data throughput performance are measured with specific transmission rates. The performances resulting from the metrics are presented with moving scenarios. To increase then confidence level of the results, a set of simulation parameters are performed with various random seeds for the data transmission.

VII. SIMULATION SETUP AND PARAMETERS

Depending on the WSN operating requirements and environment, there has to be compromises between the node transmission range, operational lifespan and device cost. The transmission range can be determined

from two-ray ground reflection models which relates the maximum range to the antenna gain, transmit power and receiver sensitivity. The data traffic type is CBR with the application agent sending at a rate of 4 data packets per second continuously. The nodes

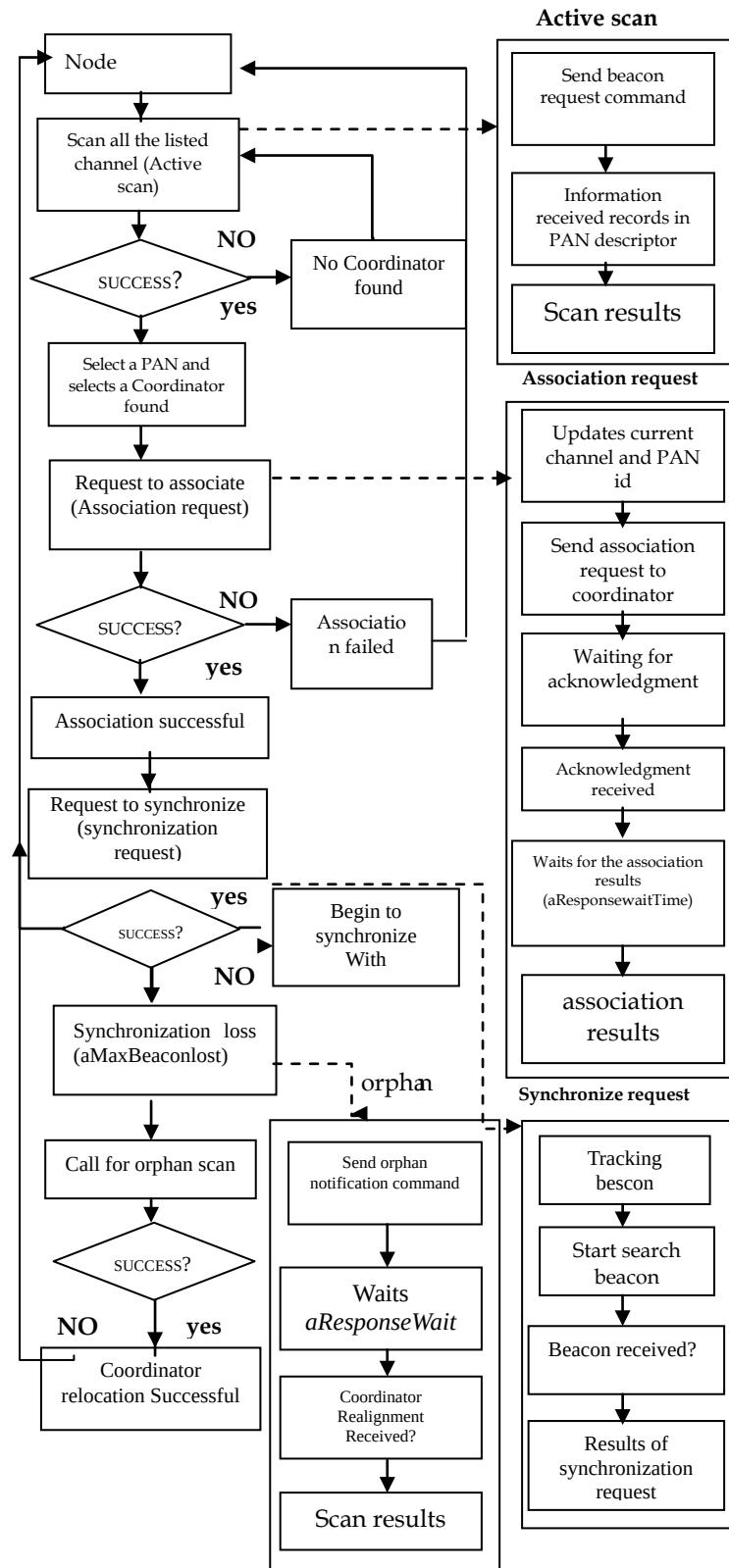


Figure 5: Flow of node association and synchronization(19)

used in the simulation will movement and placed at random position generated by setdest in ns-2.

The centre node is designated the PAN coordinator with all other nodes randomly transmitting data packets to the PAN coordinator. The speed and heading of each node will vary according to the generated movement scenario with a maximum simulation runs of one hour. The simulations are

During the simulation, certain behaviors are exhibited by the nodes if communication cannot be

established with the coordinator. When a node losses synchronization, orphan-scanning is performed to relocate the coordinator. When coordinator relocation is successful, communication will resume. If relocation of the coordinator fails, node will subsequently perform active channel scan to send association request to the PAN coordinator. Upon successful association, the node begins to transmit beacons and start data transmission. Else, non-beacon mode is enabled for that node.

Table 1: Simulation Parameter

Parameter	Value
Topology	Random
Number of Nodes	25
PAN coordinator location	random
Area of simulation	500 m*500 m, wide
Simulation time	3600 second
No. of sink (destination)	One (Node 12)
No. of sources	20 sources (Node 0 to20 except node 12)
Speed	Varying from 0.006m/s 0.47m/s(ocean env)
Pause Time	300 second
Traffic Type	Constant Bit Rate (CBR)
Data packet length	70 bytes
Connection Rate	0.05 to 4 packets per second
Routing protocol	DSDV
Radio-propagation model	TwoRayGround
Interface queue type	DropTail/PriQueue
Maximum packet in Queue	150
Network interface type	Phy/WirelessPhy/802_15_4
MAC type	Mac/802_15_4
Antenna type	OmniAntenn
Transmitting Power(pt_)	0.001 Watts
receiver threshold (RXThresh_)	3.981e-13 Watts
capture power threshold(CPThresh_)	10 dB
carrier sensing threshold(CSThresh_)	3.981e-13 Watts
Operating Freq(freq_)	2.4e+9 GHz
System loss factor(L_)	1.0
Bandwidth	10 Mbps

VIII. SIMULATION RESULTS AND DISCUSSION

a) The packet delivery ratio

In DSDV, if it is not possible for the packets to be delivered, DSDV tries to drop them which means a lesser PDF as well as less delay Furthermore, DSDV is a

table-driven protocol and updates its table periodically which leads to an increase in the routing load in the network and less PDF in movement with high speed, but in this simulation and as we seed in previous scenarios that DSDV protocol with low speed network perform high throuput and PDF nearly to 100%. As oc-

ean environment speed of sensor node slowly moving has 0.47 m/sec based ocean speed, then DSDV algorithm has better packet delivery rate as in fig 6. In contrast, pdf in DSDV is 50 % at time 5.47 sec and

increases by approximately 98% at time between 5.5 to 70.46 sec. then pdr take in constant from at time between 80 to 125.11, so pdr at time 125.11sec become 99 % .

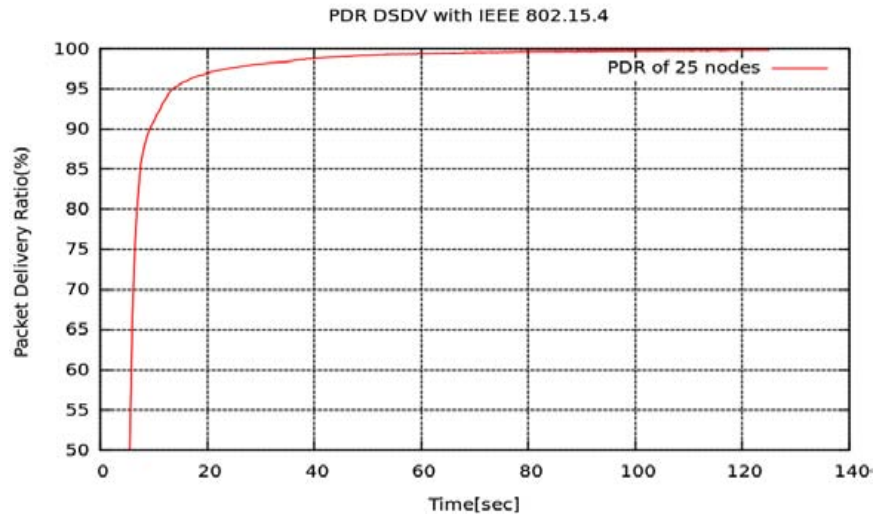


Figure 6: Packet delivery ratio vs simulation time

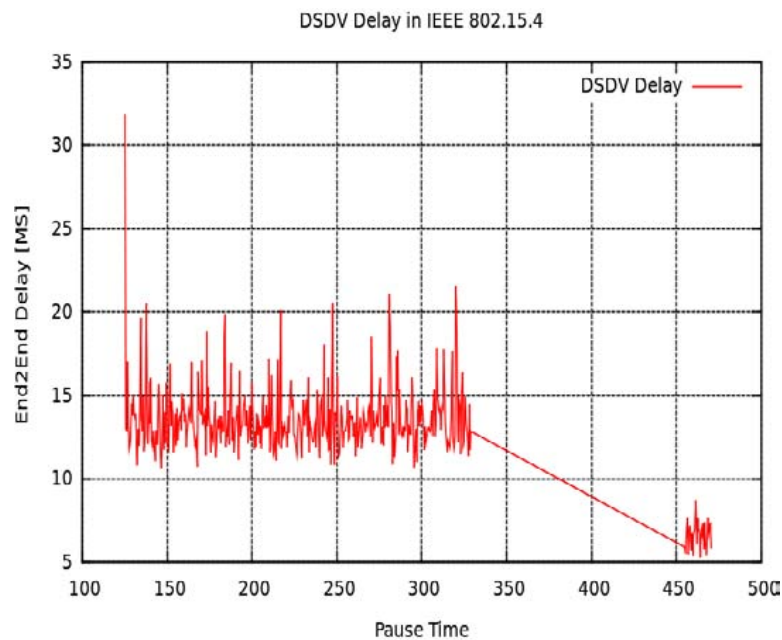


Figure 7: Ave End 2 End Delay vs Movement in Time

b) End-to-End delay

These graphical results from fig. 7 are measurement of Delay extremely powerful. It shows that End-to-End delay in IEEE 802.15.4 with DSDV is lowest as compared with the other routing protocols we are see them in several researches as in [23] .

This shows that for delay-sensitive applications, DSDV protocol with IEEE 802.15.4 standards is remarkably well suitable. This attribute can be explained by the fact that DSDV is a proactive routing protocol and in these types of protocols the path to a destination is immediately available. In other words, there is

no delay caused by routing discovery. Furthermore, DSDV routing protocol tries to drop the packets, if it is not possible to deliver them which means less delay.

c) The Throughput

The network throughput in general, increases steadily over the entire simulation time. DSDV attains the highest throughput and shows efficient behavior in all mobility scenarios. The reasons for this good throughput include: firstly, when the first data packet arrives, it is kept until the best route is found for a particular destination. Secondly, a decision may delay to a decision may delay to advertise the routes which are

about to change soon, thus damping fluctuations of the route tables. The re-broadcasts of the routes with the same sequence number are minimized by delaying the advertisement of unsterilized routes. This enhances the

accuracy of valid routes resulting in the increased throughput of DSDV in 4 packet/sec of mobility rate, as depicted in Fig.8

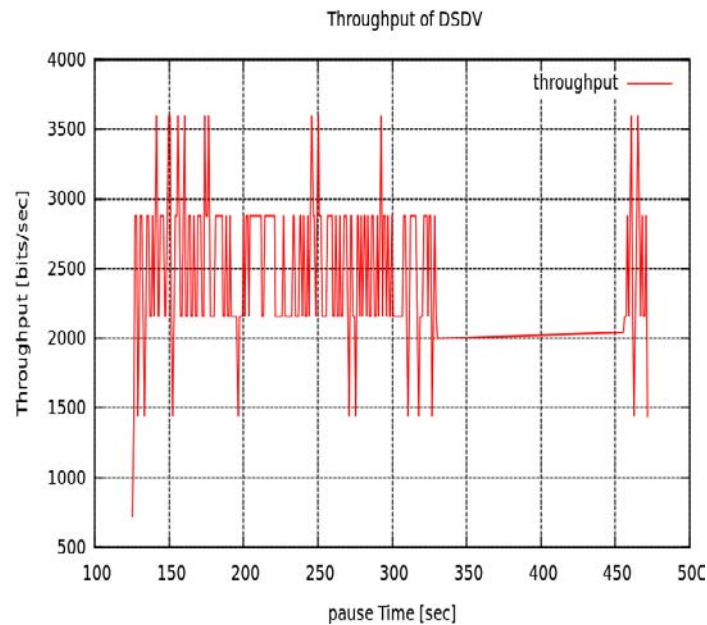


Figure 8: Results of Network Throughput with Node Movement of Time

Table 2: QoS parameter results of DSDV on IEEE.802.15.

NO.	Parameter	value
1.	No. of CBR Packets Generated	86314 packets
2.	No. of CBR Packets sent	83166 packets
3.	No. of CBR Packets received	84821 packets
4.	No. of routing packets	3104 packets
5.	Total No. of MAC Packets sent	36056 packets
6.	Total No. of Fwd packets	398 packets
7.	Total No. of Dropped (packets	259748 packets
8.	Packet Delivery Ratio (PDR %)	99.989996 %
9.	Network Throughput	1.536942 kbits/sec
10.	Average node Throughput	38.423553 kbits/sec
11.	Normalized routing load	3.659471 packets %
12.	Average end to end delay	13.065065 ms

IX. CONCLUSION AND FUTURE WOKE

Since The IEEE 802.15.4 standard is being designed to be used in a wide variety of applications which require low send rates over short-range distances with limited power and relaxed throughput needs. This consider problem for routing protocols when need to transmitting of large routing packet especially in network that contain large number of mobile hosts. thus , Because full dump packets that generated by DSDV to routes update and by progress of simulation time in pervious sensor scenario then routing tables at each node become large to maintain all topology of network and this require large bandwidth to exchange these packets . As resulting of that much dropped packet will occur because The IEEE 802.15.4 not enabled large packets transmission.

To this cause PDF of DSDV with progress of simulation time take in decrease. So, the problems in this protocol will taken consideration and The performance comparison with other routing protocols can be done in different classes of parameters and operating conditions, which will be useful for actual deployment of sensor network in particular application of industrial control.and improvement of DSDV protocol to achieve high QoS in terms of packet delivery ratio and end-to-end delay to support multimedia applications by this protocol over WSNs.

REFERENCES RÉFÉRENCES REFERENCIAS

1. Venetis Kanakaris, David Ndzi, and Kyriakos Ovaliadis." *Applications of MANET Routing Protocols in Sensor Network* ".Department of Electronic and Computer Engineering, University of Portsmouth,

- Portsmouth, United Kingdom. International Journal of Research and Reviews in Ad hoc Networks (IJRRAN) Vol. 1, No. 4, December 2011, ISSN: 2046-5106 © Science Academy Publisher, United Kingdom, www.sciacademypublisher.com .
2. Mohammed Gawiya, Abdullah Al-quha, Ali Al lathaaa, Zaid Amrana and Mohammed Al-Hubaishi. ;"Performance Analysis of Destination Sequenced Distance Vector Routing Protocol in MANET". International Journal of Ad Hoc, Vehicular and Sensor Networks.
 3. C. Perkins, E. Belding-Royer, and S. Das, "RFC3561: Ad hoc ondemand distance vector (AODV) routing". Available: <http://www.ietf.org/rfc/rfc3561.>, ed, July 2003.
 4. S. Ahn and A. U. Shankar, "Adapting to route-demand and mobility in ad hoc network routing," Computer Networks, vol. 38, pp. 745–764, April 2002.
 5. U. Lee, S. F. Midkiff, and J. S. Park, "A proactive routing protocol for multichannel wireless ad-hoc networks (DSDV-MC)," in IEEE International Conference on Information Technology: Coding and Computing (ITCC 2005) Las Vegas, NV, United states, April 2005.
 6. Boukerche and S. K. Das, "Congestion control performance of RSDSV protocol in multihop wireless ad hoc networks," Wireless Networks, vol. 9, pp. 261–270, 2003.
 7. R. R. S. Kumar, and D. Pandey, "OPR: DSDV Based New Proactive Routing Protocol for Ad-Hoc Networks," in International Association of Computer Science and Information Technology – Spring Conference (IACSIT-SC 2009), Singapore, April 2009, pp. 204–207.
 8. R. U. Z. K.U.R. Khan, A.V. Reddy, K.A. Reddy, and T. Harsha, "An Networks and its Performance Comparison," in The 2nd UKSIM European Symposium on Computer Modeling and Simulation, Liverpool, United kingdom, September 2008, pp. 506–511.
 9. T. Liu and K. Liu, "Improvements on DSDV in mobile ad hoc networks," in International Conference on Wireless Communications, Networking and Mobile Computing (WiCom 2007), Shanghai, China, September 2007, pp. 1637–1640.
 10. T. T. Luong, B. S. Lee, and C. K. Yeo, "Dual-interface multiple channels dsdv protocol," in 5th IEEE International Conference on Wireless and Mobile Computing Networking and Communication, WiMob 2009, Marrakech, Morocco, October 2009, pp. 104–109.
 11. T. T. Luong, B. S. Lee, and C. K. Yeo, "Channel allocation for multiple channels multiple interfaces communication in wireless ad hoc networks," in The 7th international IFIP-TC6 networking conference on AdHoc and sensor networks, Singapore, May 2008, pp. 87–98.
 12. S. Chang, W. Ting, and J. Chen, "Method for Reducing Routing Overhead for Mobile Ad Hoc Network," in IEEE International Conference on Wireless Communications and Signal Processing (WCSP 2010), Suzhou, China, October 2010.
 13. IEEE Std 802.15.4TM " 2003, Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (LR-WPANs), Institute of Electrical and Electronics Engineers, 2003.
 14. Yadav, N. and Yadav, R. (n.d). "The Effects of Speed on the Performance of Routing Protocols in Mobile Ad-hoc Networks". International Journal of Electronics, Circuits and Systems Volume 1 Number 2.
 15. W. S. Conner, J. Heidemann, L. Krishnamurthy, Xi Wang, and M. Jarvis, "Workplace Applications of Sensor Networks," In Wireless Sensor Networks: A Systems Perspective, Nirupama Bulusu and Sanjay Jha (eds.), Artech House, August 2005 (to appear).
 16. M. Ros, M. D'Souza, M. Chan, K. Bialkowski, A. Postula, N. Bergmann, and A. Toth, "Using Wireless Sensors as Selection Devices for a Multimedia Guidebook Scenario", In Proc. RealWSN, Workshop on Real-World Wireless Sensor Networks, Stockholm, Sweden, 20-21 June 2005.
 17. Siddhu Warriar, "Characterisation and Applications of MANET Routing Algorithms in Wireless Sensor Networks", Master of Science School of Informatics, University of Edinburgh, 2007.
 18. IEEE Std 802.15.4TM " 2003, Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (LR-WPANs), Institute of Electrical and Electronics Engineers, 2003
 19. Zen, K., Habibi, D., Rassau, A. M., & Ahmad, I. "Performance Evaluation of IEEE 802.15.4 for Mobile Sensor Network". Proceedings of 5th IFIP International Conference on Wireless and Optical Communications Networks. WOCN '08. (pp. 1-5). Surabaya, East Java Indonesia. IEEE Press. (2008) <http://ro.ecu.edu.au/ecuworks/1175>.
 20. NS2, "Network Simulator 2 (Ns2) <http://www.isi.edu/nsnam/ns/>," ed.
 21. h. w. c. g. e. f. E. Z. g. h. "Georgia Tech Internetwork Topology Models (GT-ITM) homepage", ed.
 22. K. Y. Lim, "a performance analysis of an ad-hoc ocean sensor network". Civilian, Singapore Technologies Dynamics Pte Ltd, University of Sheffield, United Kingdom, December 2006.
 23. D.D. Chaudhary (Member IACSIT), Pranav Pawar, Dr. L.M. Waghmare, "Comparison and Performance Evaluation of Wireless Sensor Network with different Routing Protocols". Aalborg University, Denmark. International Conference on Information and Electronics Engineering IPCSIT vol.6 (2011) © (2011) IACSIT Press, Singapore.
 24. Mannasim Framework, a module for WSN simulation, <http://www.mannasim.dcc.ufmg.br/>



GLOBAL JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY: E
NETWORK, WEB & SECURITY
Volume 17 Issue 1 Version 1.0 Year 2017
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

The Components that can Build Flexible & Efficient Software Defined Network

By Deepak Kumar & Manu Sood

Himachal Pradesh University

Abstract- SDN (Software Defined Network) is a new networking approach towards current networking industry. S.D.N has attracted the researchers attention, because there is wide scope of innovation and research. The main concept behind the SDN networks is the separation of controller from data plane. This natural feature makes SDN adaptive of being flexible and scalable. We are mentioning some of the important components those are needed to make current SDN networks even better and efficient that can be managed easily and updated whenever needed, without any interruption of services. Also we have discussed how we can manage the data plane, control plane and how we can identify where fault has occurred.

Keywords: SDN, hypervisor, virtualization, openflow, programmable data plane.

GJCST-E Classification: C.2.1, C.2.2



Strictly as per the compliance and regulations of:



The Components that can Build Flexible & Efficient Software Defined Network

Deepak Kumar ^α & Manu Sood ^σ

Abstract- SDN (Software Defined Network) is a new networking approach towards current networking industry. S.D.N has attracted the researchers attention, because there is wide scope of innovation and research. The main concept behind the SDN networks is the separation of controller from data plane. This natural feature makes SDN adaptive of being flexible and scalable. We are mentioning some of the important components those are needed to make current SDN networks even better and efficient that can be managed easily and updated whenever needed, without any interruption of services. Also we have discussed how we can manage the data plane, control plane and how we can identify where fault has occurred.

Keywords: SDN, hypervisor, virtualization, openflow, programmable data plane.

1. INTRODUCTION

In a Software-Defined Networks (SDN) the controller resides in the control plane that controls the heterogeneous forwarding devices. The main concept behind the SDN is the Data Plane and Control Plane separation, virtualization and programmatic control. Controller can change the functionality of the forwarding devices through command by changing the rules and policies. The main purpose of the SDN is to satisfy the changing needs of enterprises and users. In SDN network administrator can change the flow of packets through centralized controller without configuring the forwarding devices (switches, routers) manually. Whenever packet came across switch (in data plane) the rules and policies installed in the firmware guide the switch where to forward the packet. The communication between the controller and data plane takes place through south bound interface usually known as OpenFlow. The architecture of SDN is as shown in Figure1. There are three layers; the 1st layer is called as application layer (management plane). The 2nd layer is called as control layer (control plane) where controller resides. The controller can be any of the NOX [1], POX [2], FLOODLIGHT [3], BEACON [4] etc. The 3rd layer is known as the infrastructure layer (data plane).

Open low [5] is a protocol that actually enables the separation of control plane from data plane. To be more specific it is not the controller that controls the data plane, it the application that uses the controller to manage the switches in data plane. SDN is much flexible compared to the traditional networks the only

risk is that it can be failed any time. The recent techniques are not that much sufficient to tell about how network would behave when controller will fail. There must be a network management service that can manage various network management applications to run independently, while monitoring and maintaining the performance as well as network safety. Various aspects of the network are captured by network state like which link is active and how switches are forwarding traffic. Different views can be seen through network state. Observed state that maintains the updated view of the actual state of the network, applications can read this state and changes in propose state are based on their own goals.

Also there is a need of system that can consistently update the network and dynamically schedules these updates based on the runtime difference in the update speed of various switches in Software Defined Networks (S.D.N). With the advent of S.D.N that provides the excellent opportunity to developers for developing basic abstractions for the management of network updates. Instability in networks are generally due to changes in the configuration that leads to unavailability of the network, performance problems and security issues. Sometimes intermediate configuration also behaves incorrectly during the update process even if the initial and final configurations are correct. S.D.N programs must be updated consistently as we update software, whether the reason is to migrate to new controller, bugs repairing and address performance issues.

Operators of S.D.N performs network updates by stopping the old controller and starting the new controller, this process cleanup the preinstalled entries of flow table that can creates problems including loss of packet, or increase in latency etc. There must be a mechanism that ensures to maintained the well defined behaviour of the network even if the change of configuration took place. The interaction between the today's datacenter and application running on them takes place in a complex way, making network operators to run various traffic management services to maintain the working of network. Also solution regarding traffic management are often limited because of the divide between the network and hosts. The network devices only deals with knowledge regarding layer of networks where as the hosts have the view how applications interacts with the network.

Author α σ: Department of Computer Science Himachal Pradesh University, Summer Hill, Shimla India.
e-mails: deepak.cs339@gmail.com, soodm_67@yahoo.com

So there must be a system that may have unified view of the both host and network so that maintenance of both takes place in easy way. Another important thing we need to be considered is packet tracing. If there is any problem regarding handling of packet, we should trace back the packet to find out the root cause. This helps in debugging the networks, testing of network performances etc. Earlier mechanism were required of modification of switches that

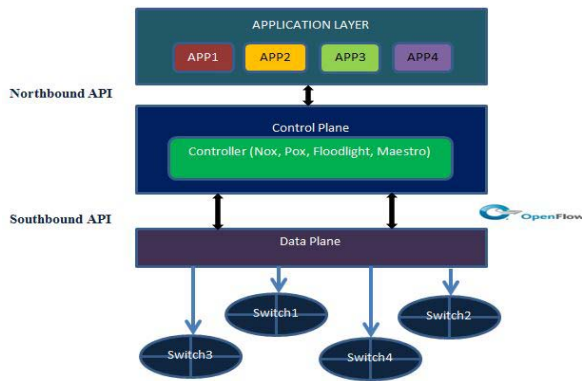


Figure 1: SDN Architecture

results in more overhead. S.D.N makes this happen to calculate the transformations that leads us to packet observations. In order to measure the flow of traffic across network paths is difficult for many management services including traffic engineering (TE) [6], diagnosing network congestion. There must be a query based language for the traffic monitoring. Also there is a need of protocol independent programming language. In next sections we are discussing few components that can make SDN much robust and efficient, like data plane performance monitoring, network performance diagnosis, hypervisor for efficient network, protocol independent language for switches, packet trace back, To find the shortest path for the forwarding of packets between switches.

II. DATA PERFORMANCE MONITORING

Data plane is generally local to each of the hardware devices like switches, routers, or the card on the router, and arrival packet speed determines how to operate them. Data plane is made up of various hardware devices of network that provides connectivity. These hardware devices are routers, Ethernet switches and firewalls. The configuration to hardware devices are provided by control plane through control interface (Open Flow) and the configuration across these devices can be updated whenever needed. In order to optimize the network configuration request is made by hardware devices to the controller (control plane). As many applications moving to the cloud day by day, so cloud operators need to diagnose performance problems consistently.

Till now Offline processing of logs is very slow and inefficient. We need a system to analyze TCP per-

formance in terms of real time across the end-host working over hypervisor or connected to NIC [7], switch etc. It should determines whether the connection is affected at the sender's end or due to the congestion across network or problem is at the receivers end because of limited buffer capacity. With the increase of edge devices that offers adjustable processing of packet at high speed on hardware devices in data plane, that makes possible to monitor TCP performance.

P4 [8] which is a protocol independent language that help us in management of the traffic. In order to minimize the state requirements of the data-plane, there is a need of detection of all connections, after that all connections are diagnosed in order to find fault across them. In Figure 2 as shown there is a need of inbuilt diagnose or trouble-shooter in the controller so that it can consistently look for problems across the network elements and manage them as soon as possible in order provide the robust and flexible network. Red arrows showing programs written in protocol independent language i.e. P4 can be implemented in data plane through controller by programmatic control. Whereas blue arrows showing the TCP traffic across the hardware devices like switches can be monitored (TCP traffic information can be sent to control plane through data plane). Here switch1 and switch2 are the edge devices Here switch1 and switch2 are the edge devices which can be monitored through controller to captures the TCP traffic.

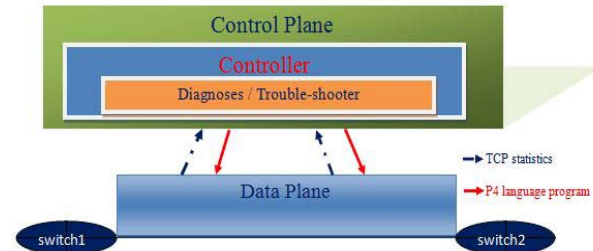


Figure 2: TCP Statistics gathering from edge devices of data plane by control plane

Diagnosis and troubleshooting will also helps to identify where the actual problem occurs: is it across sender or it is at receivers end or it is due to the network congestion. In order to make this happen, there is a need of protocol independent language like P4 through which we can write programs and be implemented through controller. can make performance of the network even more better, if we use the network elements (switches, router etc.) that supports the protocol independent languages.

III. NETWORK PERFORMANCE DIAGNOSIS

Control plane or the controller provides the global view of the network, enabling the network administrator to update the rule, policies or protocol across the hardware devices lying in data plane at any time whenever need to be updated. S.D.N platform

provides controller the capability to intelligently control the network elements; like we can change the topology across network device if any intruder try to interrupt the flow of packet, in that case controller can intelligently sense that someone across the hardware device trying to steal information or interrupting the service e.g. in figure 3 as shown, when intruder (yellow triangle) tries to access across switch3 then switch3 report to controller through data plane. Controller than change the topology of underlying switches, as initially flow of packet takes place from switch1 to switch5 through path switch1-switch3-switch4-switch5 (blue dotted line) but due to intruder interruption across switch3, controller update the new topology across the switches, so now flow of packet between switch1 and switch5 is takes place through path switch1-switch2-switch4-switch5 (green dotted lines). This functionality of handling hardware resources through programmatic control makes S.D.N suitable choice for current networking environment.

In order to make S.D.N more efficient there is need of handling many things like, what if controller fails, in that case the whole network will suffer.

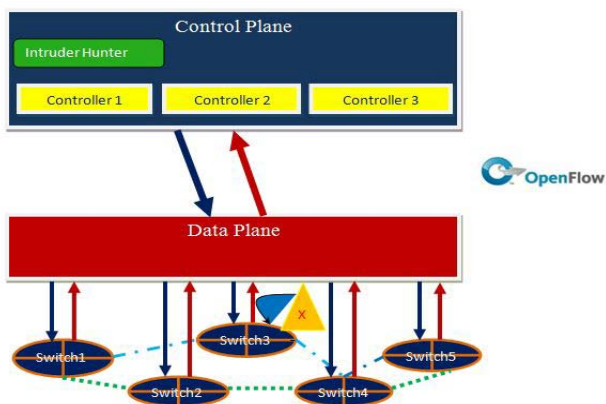


Figure 3: Intruder handling through control plane

The solution of this problem is that, there should be more than one controller in the control plane. So that if one fails other controller will control the flow of packet through programmatic control across switches. By doing so network will behave normally as there was no problem. Having more than one controllers also have other advantages, like while upgrading the controller, during that time if any fault occur in data plane then other controller will handles all the faults or provide services to the network elements, only limitation of having more than controller the cost. For an efficient network the switch should be intelligent, so that they may be able to configure the shortest path to reach the destination.

IV. HYPERVISOR FOR EFFICIENT NETWORK

A hypervisor commonly also known as virtually machine monitor (VMM) is a software program that is part of virtualization technology. Hypervisor [9] mainly is

lates controllers (network operating system) or various business applications from the underlying hardware devices in data plane. As we have discussed in section 3.

A centralized controller in S.D.N react to network condition those are changed by upgrading the rules and policies across the hardware devices in the data plane. Every software need upgrades to fix errors, to add new features. Similarly for upgrading the controller, it need to be stopped, while during this transition, network will fail. So the idea of multiple controllers came. This idea helped to manage the network even when the one of controller fails, because other controllers are capable enough to handle any interrupt or fault along any hardware resources.

One another important point came, if controller1 installed the rule and policies across hardware devices and got failed, in that case will other controller like controller2 and controller3 will support the policies or rules installed by controller1. For this thing to happen all of controllers (as in our example: controller1,controller 2 and controller3) must linked or coordinate with each other.

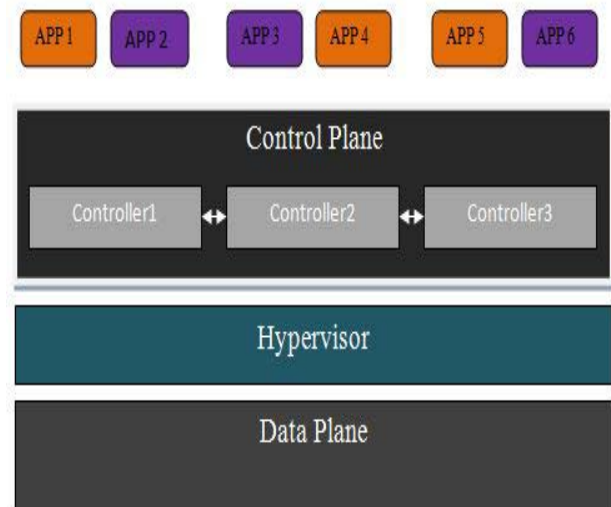


Figure 4: Role of hypervisor

The thing that help the controller to coordinate with each other is called hypervisor. As hypervisor is a natural platform to support multiple operating system providing hardware devices the illusion of having only the one controller and is providing services to the individual hardware device (whether it is router, switch or access-point).

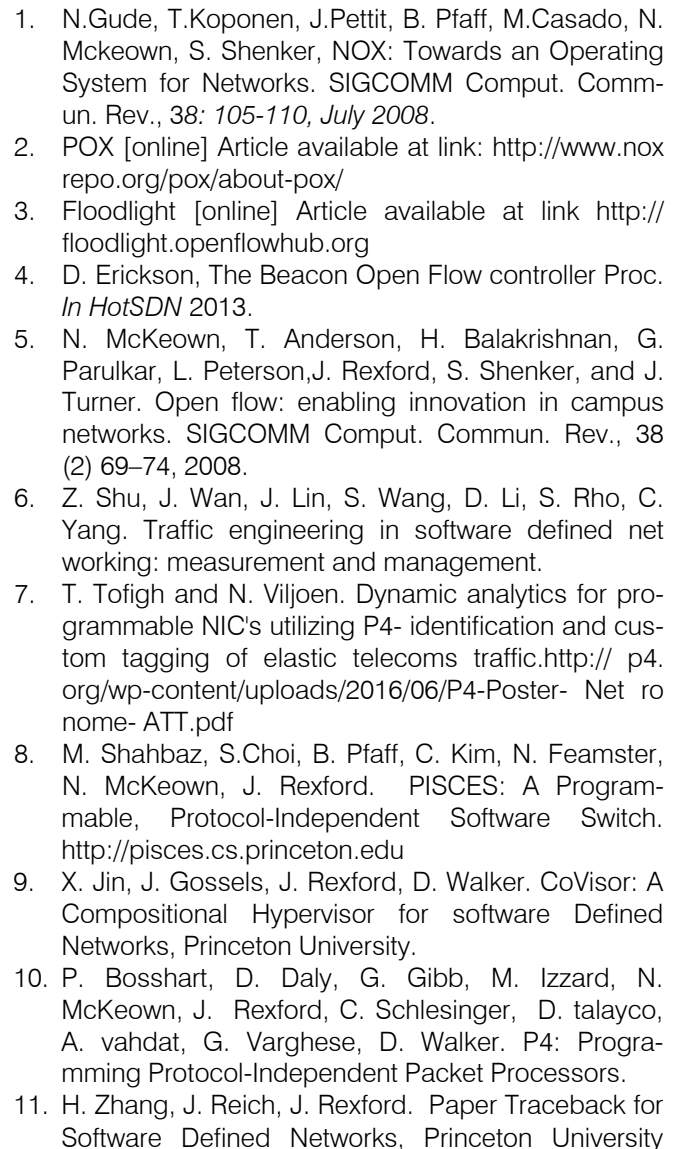
V. PROTOCOL INDEPENDENT HIGH LEVEL LANGUAGE

The heading One of the high level language suitable for the programmed packet handler which is protocol independent is P4 [10], One of the high level language suitable for the programmed packet handler which is protocol independent is P4, P4 stands for Programming Protocol-Independent Packet Processors. P4 works in collaboration with the Open Flow protocol.

these are the approaches that we have to be considered. By considering these we can overcome and handle various faults. The switches must be intelligent enough to decide where to forward the packet in the case when controller is not responding. The main purpose of doing is that the traffic must remain in the data plane. The use of multiple controller is prime factor for making S.D.N networks much more flexible. The only portion where the S.D.N networks lack is the security. There are various other approaches needed which can make current network even much more secure.

Also if we use of the Big Data concept, that can help S.D.N to be more scalable. As this is a new trend in Networking technology so the chances of research are much more, because S.D.N in itself is very broad concept.

REFERENCES RÉFÉRENCES REFERENCIAS



only if the first bit of the source IP is 1, otherwise forwarded to the switch C. As this switches B and C also forwards the packet to switch A, e.g. if switch C receives a packet with IP whose first bit is 1, then that packet would be dropped. Therefore by doing so we can determine that packet-P have not followed the path through switch C but have traversed the path through switch D-switch B- switch A.

Till now we have discussed various factors that can help us to build flexible and robust network. So all of



GLOBAL JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY: E
NETWORK, WEB & SECURITY
Volume 17 Issue 1 Version 1.0 Year 2017
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

A New Networks Intrusion Detection Architecture based on Neural Networks

By Berlin H. Lekagning Djionang & Dr. Gilbert Tindo

University of Yaoundé I

Abstract- Networks intrusion detection systems allow to detect attacks which cannot be detected by firewalls. The false positive and false negative problem tend to make IDS inefficient. To improve those systems' performances, it is necessary to select the most relevant that will lead to characterize a normal profile or an attack. We have proposed in this paper a new intrusion detection system architecture and a scheme to flexibly select groups of attributes using neural networks in order to improve results that we have got with our architecture. The selection approach is based on a contribution criteria that we have defined in function of precision measures of type HVS (Heuristic for Variable Selection). The selected subset depends on a threshold that we make vary in function of a defined criteria. He have done a comparative study of this approach and the one without attributes selection.

Keywords: NIDS, neural network, features selection, MLP, NSL-KDD data set.

GJCST-E Classification: C.2.1, C.2.2



Strictly as per the compliance and regulations of:



A New Networks Intrusion Detection Architecture based on Neural Networks

Berlin H. Lekagning Djionang ^α & Dr. Gilbert Tindo ^α

Abstract- Networks intrusion detection systems allow to detect attacks which cannot be detected by firewalls. The false positive and false negative problem tend to make IDS inefficient. To improve those systems' performances, it is necessary to select the most relevant that will lead to characterize a normal profile or an attack. We have proposed in this paper a new intrusion detection system architecture and a scheme to flexibly select groups of attributes using neural networks in order to improve results that we have got with our architecture. The selection approach is based on a contribution criteria that we have defined in function of precision measures of type HVS (Heuristic for Variable Selection). The selected subset depends on a threshold that we make vary in function of a defined criteria. He have done a comparative study of this approach and the one without attributes selection. A comparative study has also been done with others works. The NSL-KDD dataset has been used to train, teste and evaluate our scheme. Our Works shows satisfactory results.

Keywords: NIDS, neural network, features selection, MLP, NSL-KDD data set.

I. INTRODUCTION

I nterconnecting systems via computer networks has been a necessity seen the 21st century. These networks are subjects to many attacks. Intrusion detection systems are a security mechanism that allows to detect attacks which has not been identified by the firewall. An intrusion being each action that can threaten confidentiality, integrity and resources availability in an information system.

The intrusion detections systems that use neural networks as classification scheme has been widely studied by many authors [1]. Most of the solution proposed in the literature have the problem of pertinence and reliability. One of the problems major of the NIDS with neuronal networks is that the performance is governed by an only big system which takes care to detect either the types, or the categories of attacks. In this work, we have proposed a modular architecture and we have presented the efficiency. In this paper, we will explore the path of selecting attributes in order to improve the efficiency of this architecture that means to obtain a good approximation function, an acceptable false positive and negative rate and a recognition rate that is not far from the ideal one. It consists on displaying relevant attributes for each normal packet and for each type of attack.

The Learning quality of a scheme based on neural networks is linked to the quality of data that we

submit to the classifier [2]. Data submitted to the classifier can influence it in many manners [3, 4]: -the recognition rate -The time required for the learning stage to obtain a satisfying recognition rate -The number of sample data necessary to obtain a satisfying recognition rate -The identification of relevant attributes - Reduce the complexity of the classifier and the execution time. Relevant attributes selection can lead to build a normal profile of a user or a particular type of attack. Input data characterization has a significant impact on many aspects of the classifier.

The follow-up of our work is organized as following: in section 2, we present the basics elements of attributes selection; in section 3, we will briefly present neural networks and their importance compared to other classifiers. In section 4 we will show some works related to attributes selection; in section 5 we will describe our attributes selection approach and algorithm, in section 6, we will present the dataset used and the preprocessing done, then in section 7 we'll present the results obtained and their analysis. We will end this work with a conclusion and prospects in section 8.

II. ATTRIBUTES SELECTION

Relevant attributes selection is a difficult problem. Attributes selections consist on identifying a subset of attributes that allows to better the performances of detection system. It helps to remove non relevant attributes, redundant or noised ones. We will in the following subsection present the elements that help to implement an efficient selection process.

a) Basics Elements of Selection

According to [5], the main procedure follows these four steps:

a- Generation procedure: allows to explore the search space in order to find relevant subsets. [6] regroups them in three categories:- **complete generation** that consists on exhaustively search in the whole dataset, which is done in $O(2^N)$. - **Sequential generation** which consists on incrementally generate the relevant subset on the whole dataset. -**Heuristic generation** which is similar to the complete generation with a predefined maximum number of iterations.

The optimal subset is evaluated using an evaluation criteria [7].

b- Evaluation: It takes as input a subset of attributes and outputs a numeric value. It allows to evaluate the

Author ^α: University of Yaoundé I, Faculty of sciences, Yaoundé, Cameroun. e-mails: dberlinherve@gmail.com, gtindo@uycde.uninet.cm

examined subset. The aim of the search algorithm is to maximize the evaluation function. [5, 8] consider many types of evaluation functions: The distance measure, the information measure, the dependency measure, the classifier recognition rate, the consistency criteria, and the precision measure.

c- Stopping criteria: It allows to know when the learning algorithm should stop since the optimum number of variables is unknown in advance.

d- Validation method: allows to make sure that the selected attributes subset is valid, to determine the number of relevant attributes, to choose different parameters and to test global performances of the system [8].

b) Selection Method Based On Neural Networks

Three main approach has been proposed in the literature to implement this procedure [4, 5]. We have the filter approach, the wrappers approach and the embedded approach. The filter approach selects attributes regardless of the classifier. The wrapper approach uses the classifier to validate the subset of relevant attributes. It uses for this purpose two strategies: the forward selection which consists to gradually add attributes and the backward selection which consists to gradually remove the attributes. The embedded approach makes attributes selection in parallel to the classification process.

III. NEURAL NETWORKS

Neural networks are strongly linked networks made of elementary processors functioning in parallel and linked by weights. These connections weights chair the network functioning. Each elementary processor computes a unique output based on information taken as inputs. Neural networks has many advantages in implementing an intrusion detection system. They are really efficient and fast in the classification task. They are able to learn and easily identify new threats which are submitted to them. Neural networks are able to handle incomplete data, imprecise and from various sources. The natural speed of neural networks help to reduce damages when a threat is detected [10]. Neural networks usage helps to extract nonlinear relationships that exist between different fields of a packet and to timely-detect complex attacks [11]. Neural networks, after having correctly learnt, have a good generalization ability, which means that they are able to compute with precision corresponding outputs even for data which have not been learnt. The flexibility that offer neural networks is also one of the asset of intrusion detection [9].

IV. SOME WORKS RELATED TO ATTRIBUTES SELECTION

Relevant variables selection help to improve the classifier efficiency. [12] are the first to use neural

networks for selecting attributes with the KDD dataset. They select relevant attributes by attack categories and use only one precision criteria from [13]. [14] uses selective analysis in their work to select relevant variables. They then use this set to classify attacks. [15] Uses information gain to determine the attributes which allow to better distinguish each type of attack. [16] Proposes a combination of approaches for network intrusion detection. They use for this purpose the genetic algorithm for attributes selection and SVM (Support Vector Machine) for classification. [17] Proposes a new selection method based on the total mean of each field's class. The selected subset is evaluated using the decision tree classifier.

V. ARCHITECTURE, APPROACH AND SELECTION ALGORITHM

Attributes selection help to find out among a set of attributes, the most relevant and those which help to better the efficiency and the performance of the classifier for a given problem. Each selection depending on the system architecture, we will first present the architecture of our solution proposed in [22]. Then we will present in this section the approach that we use and the selection algorithm that we have designed.

a) Proposed Architecture

The architecture that we have used in our works is the one shown in [22], on which performances have been studied. As shown in Figure 1, it is a modular architecture organised in four stages. We have called this architecture MAMBiM: Multiple Attack Multiple Binary MLP.

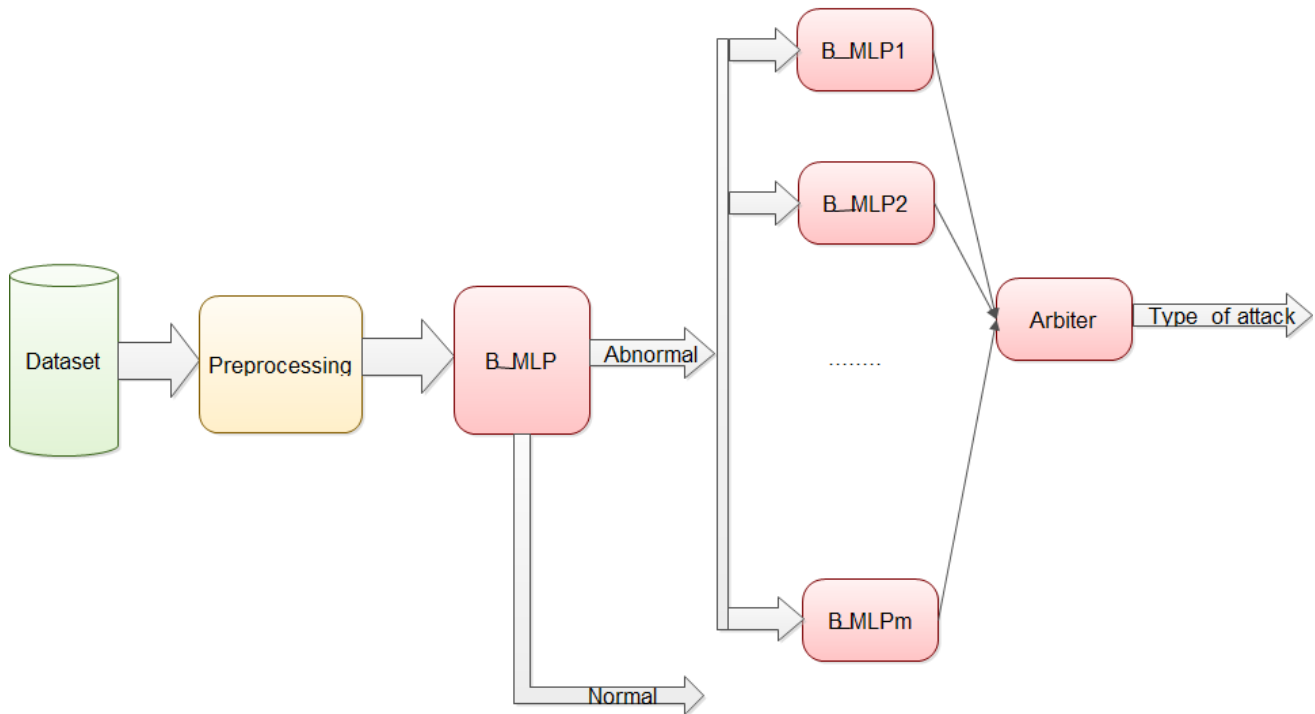


Figure 1: Four_level instruction detection architecture (MAMBIM)

In this four-level architecture, the first level helps to preprocess data. The second one discriminate normal packets from abnormal ones. If the packet analyzed is abnormal, the nit it is thrown to other models (third level) to determine the type of attack. Element **A** (fourth level) in this architecture stands as a referee which will decide which type of attack it is. Each module is a neural network with one entry stage, one hidden stage and one output stage.

To better the results obtained with our architecture in [22], we have chosen the heuristic approach based on neural network to select relevant attributes.

b) Selection Approach Used

Evaluation criteria that we have used are presented in [2]. The generation procedure is a heuristic. The approach that we use is the one based on using neural model to select relevant attributes. We have proposed a relevance measure inspired from entropy. This measure is presented in (a). We will also present the measure having zero order given in [2] to evaluate the efficiency of our precision measure. This measure is described in diagram (b). The contribution formula that we propose in our work to evaluate an attribute contribution compared to the others is described in (c). Our approach implies a comparative study of the architecture performances in accordance with different precision measures chosen.

$$P_i = \sum_{j=1}^h \left(\left(\frac{|w_{ij}|}{\sum_{k=1}^n |w_{kj}|} \right) \log \left(\frac{|w_{ij}|}{\sum_{k=1}^n |w_{kj}|} \right) \right) * \frac{|w_j|}{\sum_{l=1}^h |w_l|} \quad (a)$$

$$P_i = \sum_{j=1}^h \left(\frac{|w_{ij}|}{\sum_{k=1}^n |w_{kj}|} \frac{|w_j|}{\sum_{l=1}^h |w_l|} \right) \quad (b)$$

$$C_i = \frac{P_i}{\sum_{j=1}^n |p_j|} \quad (c)$$

The measure presented by YACOUPI in (b) neglect the information quantity factor contained in

$$\log \left(\frac{|w_{ij}|}{\sum_{k=1}^n |w_{kj}|} \right).$$

Our measure has two parts: - the part $\left(\frac{|w_{ij}|}{\sum_{k=1}^n |w_{kj}|} \log \left(\frac{|w_{ij}|}{\sum_{k=1}^n |w_{kj}|} \right) \right)$ determines the influence of input neurons weights on the hidden layer. ; - the last part $\frac{|w_j|}{\sum_{l=1}^h |w_l|}$ determines the influence of output neurons on the target. P_i determines the influence of the variable i on the final decision.

We will then make a comparative study of performances compared to the model which has been trained by the set of attributes from the variables space. The selection approach that we will use is a wrappers approach from blocks variables downward strategy. It is illustrated in **figure 1**. And this is based on criteria (c).

c) Our Selection Algorithm

We do mention here that the error retro propagation algorithm which is used to train the neural network.

The principle of our selection method is described in the following steps:

- Learn the network with the set of variables (of size N) from the space of variables using the errors retro propagation algorithm ;
- Evaluate the pertinence of each attribute using formulas (a) or (b) ;
- Evaluate the contribution of each variable using formula (c) ;
- Choose a contribution criteria of our choice : a threshold Θ ;
- select the variable which satisfy the threshold ($C_i \geq \Theta$) as relevant, we obtain a set E' with size N-P, P being the number of variables that do not satisfy the condition ;
- Dynamically look for the number of neurons from hidden layer, which gives the best performance with this set of chosen variables ;
- Evaluate the network using this set and compare the performances with performances of networks with no variables selection;
- Repeat until the choice of the threshold (3) matches with the performance targeted in terms of false positive, false negative and recognition rate.

VI. TEST DATASET AND PREPROCESSING

Since 1999, KDD Cup 99 is used as sample dataset in behavioural intrusion detection systems. Each packet from the KDD Cup 99 dataset is made of 41 fields and is labeled as a normal or an abnormal packet with types of attacks. Amidst these fields, 37 are of type numeric and 4 are of type non numeric. KDD99 combine 37 types of attacks. These attacks are subdivided in four major classes: DOS, U2R, R2L and Probes [19, 20].

- **DOS (Denial of service attacks):** they are attacks that target to threaten availability of services by overloading computers resources, servers or target networks. These attacks succeeded in networks have as consequence to freeze network traffic.
- **Probes:** attack which aims to gather information on the target that can help an attacker to trigger an attack. There exist many types of probes attacks: some abuse legitimate users and others use engineering techniques to gather information.

- **R2L (Remote to Local):** attack which aims to bypass or usurp authentication credentials to execute commands. Most of these attacks derive from social engineering [18].
- **U2R (User to Root):** This attack comes from inside. The attacker usurp the super administrator password and thus the other users' passwords. Most of these attacks come from buffer overloading caused by programming errors [19].

KDD99 dataset contains many redundant packets in training data, as in test data [20]. Redundant data are able to give more importance to a type of attack than it merits. [20] propose NSL-KDD which is an excellent dataset for comparing network IDS. Our experimentation has been done with NSL-KDD, the type of attack and the number in the training and test datasets are proposed in **table 4** in appendix. The fields in the packets are described in **table 5** in appendix.

a) Preprocessing

Pre-processing focus on non-numeric fields. Non numeric fields are: type of protocol (TCP, UDP, ICMP), type of service (AOL, auth, bgp, Z39_50), flag (OTH, REJ, RSTO, RSTOS0, RSTR, S0, S1, S2, S3, SF, SH) and the packet's class (Normal or Abnormal). For type of protocol, we assign the following numeric values: TCP=1, UDP=2 and ICMP=3. We assign 1 to normal packets and 0 to abnormal packets. For field type of service and flag, we can assign numeric values in their total number ascendant or descendant order. [21] has shown the limits of such an approach. He propose to assign random values to those fields. In our work we have assigned random values from 1 to 10 to fields of type flag, and random values from 1 to 65 to fields of type of services.

b) Normalization

It consist on transforming data to make them vary between 0 and 1, in order to make them homogeneous and thus simplify network learning. We will in this paper use the Min-Max normalization. Let be $\min_x$ and $\max_x$ respectively the minimum and the maximum of values of attribute X of value V , the normalized value is $V' = \frac{v - \min_x}{\max_x - \min_x}$. For each attribute of data vector, compute its normalized value and replace it with the normalized value.

VII. EXPERIMENT AND RESULTS ANALYSIS

To evaluate our models, we will use many indicators: recognition rate (TR), false positive recognition rate (TFP), detection rate (TR) and false negative rate (TFN). This rate is computed as following:

$$TR = \frac{NN+AA}{NN+AA+AN+NA} * 100,$$

$$TFP = \frac{NA}{NA+AA} * 100,$$

of data that we submit to each network is reduced compared to initial data.

a) Results analysis with a dynamic threshold

Here we present results obtained. The fields of packets from dataset are presented in appendix in **table 5**. This first table presents results with criteria

(a). We have only presented some types of attacks. After that, we have presented the results per type of attack with our performance measure and we have compared with YACQUP measure.

with our performance in
with YACOUF measure.

with our performance measure and we have compared with YACQUP measure.

23

Global Journal of Computer Science and Technology (E) Volume XVII Issue I Version I

each type of attack. This work allows us to better the results we have presented in [22].

PROBES	ipsweep	24	99,1	24	99,1
	nmap	18	86,90	26	97,04
	portsweep	31	99,18	31	97,7
	satan	30	95,52	25	95,32
	back	41	70,52	40	68,30
	land	41	100	38	100
DOS	neptune	21	99,62	15	99,10
	pod	30	98,84	21	97,67
	smurf	41	99,7	41	99,7
	teardrop	41	99,7	41	99,7
U2R	buffer_overflow	40	84,62	30	100
	loadmodule	40	100	5	100
	perl	41	66,67	30	66,67
	rootkit	7	80	17	100
	warezclient	41	97,63	34	96,84

Taking in consideration this table, we can see that our criteria give better results compared to Yacoup criteria. In contrast, the number of variables necessary to obtain this result is broadly greater than the number of variables generated with Yacoup criteria. We have by this work displayed descriptors for each type of attack with neural network model. We notice that when the number of variables decreases in the neural network model, the learning rate also decreases for some type of attack.

ii. Comparative study with other works

We propose in the following table a comparative study of our work with works done by three authors

on designing NIDS with explicative variables selection. Our results are presented in two columns: the first deals with a learning scheme without selection whereas the second deals with our work based selection. The non-convincing results have been better with dynamic selection. The previous table present a comparative study of the two criteria.

Table 3: Comparative study with other works

Category	Type of attack	DJIONANG		SIVA	GOLOKO
		Without selection % [22]	With Selection%	%	%
R2L	ftp_write	60	40	33,3	100
	guess_passwd	93,01	94	100	100
	imap	83,33	84	100	9,09
	multihop	33,3	66,7	22,2	0
	phf	100	100	100	100
	warezmaster	100	100	95,2	94,12
PROBES	ipsweep	99,35	100	97,1	93,93
	nmap	95,48	100	100	48,29
	portsweep	99,67	100	100	47,98
	satan	96,48	100	99,8	96,45
	back	70,52	68,30	99,4	100
	land	100	100	100	0
DOS	neptune	99,96	93,96	100	80,6
	pod	96,51	100	100	0
	smurf	99,7	99,7	100	100
	teardrop	98,96	100	66,7	100
U2R	buffer_overflow	100	100	68,2	0
	loadmodule	100	100	100	0
	perl	33,3	66,7	100	0
	rootkit	80	100	23,1	100
	warezclient	96,84	97,63	-	100

The results clearly show that our results are clearly better than works of the authors who have dealt with intrusion detection by type of attack.

VIII. CONCLUSION

We have in this paper, proposed a modular architecture for network intrusion systems based on neural networks and proposed an algorithm for selecting attributes that allows us to propose descriptors for each type of attack. These new descriptors have helped us to better predict different types of attack. In terms of perspectives, we plan to propose a NIDS which timely detects networks attack.

REFERENCES RÉFÉRENCES REFERENCIAS

- Berlin H Lekagning Djionang and Gilbert Tindo."Network Intrusion Detection Systems based Neural Network:A Comparative Study". International Journal of Computer Applications 157(5):42-47, January 2017
- Philippe LERAY and Patrick GALLINARI « Feature Selection with Neural Networks" Behaviormetrika, Vol 26, pp 16-42, 1998
- Olivier Lezoray «Segmentation d'images par morphologie mathématique et classification de données par réseaux de neurones : Application a la classification de cellules en cytologie des séreuses » THESE UNIVERSITE de CAEN/BASSE-NORMANDIE janvier 2000.
- Saba EL FERCHICHI "sélection et extraction d'attributs pour les problèmes de classification" THESE UNIVERSITE de LILLE janvier 2013.
- Dash, M. and Liu, H. "Feature selection for classification. Intelligent Data Analysis",1. 131 -156. (1997)
- José Crispín HERNÁNDEZHERNÁNDEZ « Algorithmes métaheuristiques hybrides pour la sélection de gènes et la classification de données de biopuces » THESE UNIVERSITE de ANGERS novembre 2008.
- Saba EL FERCHICHI "sélection et extraction d'attributs pour les problèmes de classification" THESE UNIVERSITE de LILLE janvier 2013.
- Guyon, I. and Elisseeff, A. (2003) An introduction to variable and feature selection. Journal of Machine Learning Research, 3. 1157-1182. October, Arlington, VA, pp . 443 -456. 1 998
- James Canady "Artificial Neural Networks for Misuse Detection," Proceedings, National Information Systems Security Conference (NISSC), 98
- G. DREYFUS "les réseaux de neurones" Mécanique Industriel et Matériaux, n51, septembre 1998
- Vladimir Golovko, Pavel Kochurko "Intruision recognition using neural networks" International Scientific Journal of computing, 2005, vol. 4, Issue3, 37-42
- Adel Ammar, Khaled Al-Shalfan "On Attack-Relevant Ranking of Network Features" (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 6, No. 11, 2015
- MEZIANE YACCOUB & YOUNES BENNAMI "Feature selection and architecture optimization in connectionist system" International journal of Neural Systems, vol 10, No 5(2000), 379-395
- S. Siva Sathya && all "Discriminant Anlysis based feature Selection in KDD Intrusion Dataset" International Journal of Computer Application Volume 31-No. 11 october 2011
- H. Günes Kayacık && all "Selecting Features for Intrusion Detection: A Feature Relevance Analysis on KDD 99 Intrusion Detection Datasets"
- Behrooz Mabadi Jahromy && all "A New Method for Detecting Network Intrusion by Using a combination of Genetic and Support Vector Machine" Journal Of Engineering and Applied Science 11 (4) 810-815, 2016
- H. S Chae, B. O. Jo, S. H. Choi, and T. K. Park, "Feature Selection for Intrusion Detection using NS L-KDD," Recent Advances in Computer Science, 2013, 184-187.
- Srinivas Mukkamala && all "Intrusion detection using an ensemble of intelligent paradigms", Journal Network and Computer Applications 28 (2005), 167-182
- Matthew Vincent Mahoney "A Machine Learning Approach to Detecting Attacks by Identifying Anomalies in Network Traffic ", these of Florida Institute of Technology, May 2003
- Mahbod Tavallaee && all "A Detailed Analysis of the KDD CUP 99 Data Set" Proceeding of the 2009 IEEE Symposium on Computational Intelligence in Security and Defense Application (CISDA 2009)
- Aslihan Ozkaya & Bekir Karlik "Protocole Type Based Intrusion Detection Using RBF Neural Network" International Journal of Artificial Intelligence and Expert Systems(IJAE), volume(3): Issue(4):2012
- BHL DJIONANG, G TINDO. "Towards A New Architecture of Detecting Networks Intrusion Based on Neural Network." International Journal of Computer Networks and Communications Security 5, no. 1 (2017): 7-18.



Appendix

Categories of Attacks In Nls-Kdd99 Dataset

Table 4: Type of Attack Per Category

Category	Type of attack	Training	Test	Category	Type of attack	Training	Test
Normal	Normal	67 343	9711	DOS	neptune	41214	4657
R2L	ftp_write	8	3		pod	201	41
	guess_passwd	53	1231		processtable	0	685
	httptunnel	0	133		smurf	2646	665
	imap	11	1		teardrop	892	12
	multihop	7	18		udpstorm	0	2
	named	0	17	U2R	buffer_overflow	30	20
	phf	4	2		loadmodule	9	2
	sendmail	0	14		perl	3	2
	snmpgetattack	0	178		ps	0	15
	snmpguess	0	331		rootkit	10	13
	warezmaster	20	944		sqlattack	0	2
	worm	0	2		xterm	0	13
	xlock	0	9				
	xsnoop	0	4				
Probes	ipsweep	3599	141				
	mscan	0	996				
	nmap	1493	13				
	portsweep	2931	157				
	saint	0	319				
	satan	3633	735				
DOS	apache2	0	734				
	back	956	359				
	land	18	7				
	mailbomb	0	293				

Different Attributes of Nsl-Kdd Dataset

Table 5 : List of Attributes with Description And Type

N°	Attribute	Description	Type
1	Duration	Duration of connection	cont
2	Protocol type	Connection protocol (tcp ou udp)	disc
3	Service	Destination service (telnet, ftp)	disc
4	Flag	Status flag of connection	disc
5	Source bytes	Byte send from source to destination	cont
6	Destination bytes	Bytes send from destination to source	cont
7	Land	1 if connection is from/to the same host/port; 0 otherwise	disc
8	Wrong fragment	Number of wrong fragments	cont
9	Urgent	Number of urgent packets	cont
10	Hot	Number of "hot" indicators	cont
11	failed logins	Number of failed logins	cont
12	Logged in	1 if successfully logged in; 0 otherwise	disc
13	Number of "compromised" conditions	Number of "compromised" conditions	cont
14	Root shell	1 if root shell is obtained; 0 otherwise	cont
15	"Su root" command attempted	1 if "su root" command attempted; 0 otherwise	cont
16	Number of "root" accesses	Number of "root" accesses	cont
17	Number of file creations	Number of file creation operations	cont

18	Number of shells prompts	Number of shell prompts	cont
19	Number of operations on access files	Number of operations on access control files	cont
20	Number of outbound commands	Number of outbound commands in an ftp session	cont
21	Is host login	1 if the login belongs to the "hot" list; 0 otherwise	disc
22	Is guest login	1 if the login is a "guest" login; otherwise	disc
23	Count	Number of connections to the same host as the current connection in the past two seconds	cont
24	Service count	Number of connections to the same service as the current connection in the past two seconds	cont
25	Syn error rate	% of connections that have "SYN" errors	cont
26	Service Syn error rate	% of connections that have "SYN" errors	cont
27	Rej error rate	% of connections that have "REJ" errors	cont
28	Service Rej error rate	% of connections that have "REJ" errors	cont
29	Same service rate	% of connections to the same service	cont
30	Different service rate	% of connections to different services	cont
31	Service different host rate	% of connections to different hosts	cont
32	Same destination host count	count of connections having the same destination host	cont
33	Same destination host and service count	count of connections having the same destination host and using the same service	cont
34	Same destination host and service rate	% of connections having the same destination host and using the same service	cont
35	Different services on current host	% of different services on the current host	cont
36	Connect to current host with same source error	% of connections to the current host having the same src port	cont
37	Connect to same service from diff. host	% of connections to the same service coming from different hosts	cont
38	Connect to current host with S0 error	% of connections to the current host that have an S0 error	cont
39	Connect to current host and specified service that have an S0 error	% of connections to the current host and specified service that have an S0 error	continu
40	Connect to current host with RST error	% of connections to the current host that have an RST error	continu
41	Connect to current host and specified service with RST error	% of connections to the current host and specified service that have an RST error	continu

GLOBAL JOURNALS INC. (US) GUIDELINES HANDBOOK 2017

WWW.GLOBALJOURNALS.ORG

FELLOWS

FELLOW OF ASSOCIATION OF RESEARCH SOCIETY IN COMPUTING (FARSC)

Global Journals Incorporate (USA) is accredited by Open Association of Research Society (OARS), U.S.A and in turn, awards “FARSC” title to individuals. The 'FARSC' title is accorded to a selected professional after the approval of the Editor-in-Chief/Editorial Board Members/Dean.



- The “FARSC” is a dignified title which is accorded to a person’s name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

FARSC accrediting is an honor. It authenticates your research activities. After recognition as FARSC, you can add 'FARSC' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, and Visiting Card etc.

The following benefits can be availed by you only for next three years from the date of certification:



FARSC designated members are entitled to avail a 40% discount while publishing their research papers (of a single author) with Global Journals Incorporation (USA), if the same is accepted by Editorial Board/Peer Reviewers. If you are a main author or co-author in case of multiple authors, you will be entitled to avail discount of 10%.

Once FARSC title is accorded, the Fellow is authorized to organize a symposium/seminar/conference on behalf of Global Journal Incorporation (USA). The Fellow can also participate in conference/seminar/symposium organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent.



You may join as member of the Editorial Board of Global Journals Incorporation (USA) after successful completion of three years as Fellow and as Peer Reviewer. In addition, it is also desirable that you should organize seminar/symposium/conference at least once.

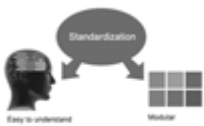
We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.





The FARSC can go through standards of OARS. You can also play vital role if you have any suggestions so that proper amendment can take place to improve the same for the benefit of entire research community.

As FARSC, you will be given a renowned, secure and free professional email address with 100 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders, Auto-Responders, Email Delivery Route tracing, etc.



The FARSC will be eligible for a free application of standardization of their researches. Standardization of research will be subject to acceptability within stipulated norms as the next step after publishing in a journal. We shall depute a team of specialized research professionals who will render their services for elevating your researches to next higher level, which is worldwide open standardization.

The FARSC member can apply for grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A. Once you are designated as FARSC, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria. After certification of all your credentials by OARS, they will be published on your Fellow Profile link on website <https://associationofresearch.org> which will be helpful to upgrade the dignity.



The FARSC members can avail the benefits of free research podcasting in Global Research Radio with their research documents. After publishing the work, (including published elsewhere worldwide with proper authorization) you can upload your research paper with your recorded voice or you can utilize chargeable services of our professional RJs to record your paper in their voice on request.

The FARSC member also entitled to get the benefits of free research podcasting of their research documents through video clips. We can also streamline your conference videos and display your slides/ online slides and online research video clips at reasonable charges, on request.





The FARSC is eligible to earn from sales proceeds of his/her researches/reference/review Books or literature, while publishing with Global Journals. The FARSC can decide whether he/she would like to publish his/her research in a closed manner. In this case, whenever readers purchase that individual research paper for reading, maximum 60% of its profit earned as royalty by Global Journals, will be credited to his/her bank account. The entire entitled amount will be credited to his/her bank account exceeding limit of minimum fixed balance. There is no minimum time limit for collection. The FARSC member can decide its price and we can help in making the right decision.

The FARSC member is eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get remuneration of 15% of author fees, taken from the author of a respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account.



MEMBER OF ASSOCIATION OF RESEARCH SOCIETY IN COMPUTING (MARSC)

The ' MARSC ' title is accorded to a selected professional after the approval of the Editor-in-Chief / Editorial Board Members/Dean.

The "MARSC" is a dignified ornament which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., MARSC or William Walldroff, M.S., MARSC.



MARSC accrediting is an honor. It authenticates your research activities. After becoming MARSC, you can add 'MARSC' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and reputé to your name. You may use it on your professional Counseling Materials such as CV, Resume, Visiting Card and Name Plate etc.

The following benefits can be availed by you only for next three years from the date of certification.



MARSC designated members are entitled to avail a 25% discount while publishing their research papers (of a single author) in Global Journals Inc., if the same is accepted by our Editorial Board and Peer Reviewers. If you are a main author or co-author of a group of authors, you will get discount of 10%.

As MARSC, you will be given a renowned, secure and free professional email address with 30 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders, Auto-Responders, Email Delivery Route tracing, etc.





We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The MARSC member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.



Once you are designated as MARSC, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

It is mandatory to read all terms and conditions carefully.



AUXILIARY MEMBERSHIPS

Institutional Fellow of Open Association of Research Society (USA)-OARS (USA)

Global Journals Incorporation (USA) is accredited by Open Association of Research Society, U.S.A (OARS) and in turn, affiliates research institutions as “Institutional Fellow of Open Association of Research Society” (IFOARS).

The “FARSC” is a dignified title which is accorded to a person’s name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.



The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as “Institutional Board of Open Association of Research Society”-(IBOARS).

The Institute will be entitled to following benefits:



The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA) The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.

The author fees of such paper may be waived off up to 40%.

The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.



The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of “Open Association of Research Society, U.S.A (OARS)” so that proper amendment can take place for the benefit of entire research community. We shall provide details of particular standard only on receipt of request from the Board.



Journals Research
inducing researches

The board members can also join us as Individual Fellow with 40% discount on total fees applicable to Individual Fellow. They will be entitled to avail all the benefits as declared. Please visit Individual Fellow-sub menu of GlobalJournals.org to have more relevant details.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.



After nomination of your institution as “Institutional Fellow” and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf.

The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:

Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.



Open Association of Research Society (US)/ Global Journals Incorporation (USA), as described in Corporate Statements, are educational, research publishing and professional membership organizations. Achieving our individual Fellow or Associate status is based mainly on meeting stated educational research requirements.

Disbursement of 40% Royalty earned through Global Journals : Researcher = 50%, Peer Reviewer = 37.50%, Institution = 12.50% E.g. Out of 40%, the 20% benefit should be passed on to researcher, 15 % benefit towards remuneration should be given to a reviewer and remaining 5% is to be retained by the institution.



We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth \$ 2376 USD.

Other:

The individual Fellow and Associate designations accredited by Open Association of Research Society (US) credentials signify guarantees following achievements:

- The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.



- In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10% discount if one is co-author or main author among group of authors.
- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- The Fellow can become member of Editorial Board Member after completing 3yrs.
- The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.
- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in-depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

//

- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of “Difference of Opinion [if any]” among the Board members, our decision will be final and binding to everyone.

//

PROCESS OF SUBMISSION OF RESEARCH PAPER

The Area or field of specialization may or may not be of any category as mentioned in 'Scope of Journal' menu of the GlobalJournals.org website. There are 37 Research Journal categorized with Six parental Journals GJCST, GJMR, GJRE, GJMBR, GJSFR, GJHSS. For Authors should prefer the mentioned categories. There are three widely used systems UDC, DDC and LCC. The details are available as 'Knowledge Abstract' at Home page. The major advantage of this coding is that, the research work will be exposed to and shared with all over the world as we are being abstracted and indexed worldwide.

The paper should be in proper format. The format can be downloaded from first page of 'Author Guideline' Menu. The Author is expected to follow the general rules as mentioned in this menu. The paper should be written in MS-Word Format (*.DOC,*.DOCX).

The Author can submit the paper either online or offline. The authors should prefer online submission.Online Submission: There are three ways to submit your paper:

(A) (I) First, register yourself using top right corner of Home page then Login. If you are already registered, then login using your username and password.

(II) Choose corresponding Journal.

(III) Click 'Submit Manuscript'. Fill required information and Upload the paper.

(B) If you are using Internet Explorer, then Direct Submission through Homepage is also available.

(C) If these two are not convenient, and then email the paper directly to dean@globaljournals.org.

Offline Submission: Author can send the typed form of paper by Post. However, online submission should be preferred.



PREFERRED AUTHOR GUIDELINES

MANUSCRIPT STYLE INSTRUCTION (Must be strictly followed)

Page Size: 8.27" X 11"

- Left Margin: 0.65
- Right Margin: 0.65
- Top Margin: 0.75
- Bottom Margin: 0.75
- Font type of all text should be Swis 721 Lt BT.
- Paper Title should be of Font Size 24 with one Column section.
- Author Name in Font Size of 11 with one column as of Title.
- Abstract Font size of 9 Bold, "Abstract" word in Italic Bold.
- Main Text: Font size 10 with justified two columns section
- Two Column with Equal Column with of 3.38 and Gaping of .2
- First Character must be three lines Drop capped.
- Paragraph before Spacing of 1 pt and After of 0 pt.
- Line Spacing of 1 pt
- Large Images must be in One Column
- Numbering of First Main Headings (Heading 1) must be in Roman Letters, Capital Letter, and Font Size of 10.
- Numbering of Second Main Headings (Heading 2) must be in Alphabets, Italic, and Font Size of 10.

You can use your own standard format also.

Author Guidelines:

1. General,
2. Ethical Guidelines,
3. Submission of Manuscripts,
4. Manuscript's Category,
5. Structure and Format of Manuscript,
6. After Acceptance.

1. GENERAL

Before submitting your research paper, one is advised to go through the details as mentioned in following heads. It will be beneficial, while peer reviewer justify your paper for publication.

Scope

The Global Journals Inc. (US) welcome the submission of original paper, review paper, survey article relevant to the all the streams of Philosophy and knowledge. The Global Journals Inc. (US) is parental platform for Global Journal of Computer Science and Technology, Researches in Engineering, Medical Research, Science Frontier Research, Human Social Science, Management, and Business organization. The choice of specific field can be done otherwise as following in Abstracting and Indexing Page on this Website. As the all Global

Journals Inc. (US) are being abstracted and indexed (in process) by most of the reputed organizations. Topics of only narrow interest will not be accepted unless they have wider potential or consequences.

2. ETHICAL GUIDELINES

Authors should follow the ethical guidelines as mentioned below for publication of research paper and research activities.

Papers are accepted on strict understanding that the material in whole or in part has not been, nor is being, considered for publication elsewhere. If the paper once accepted by Global Journals Inc. (US) and Editorial Board, will become the copyright of the Global Journals Inc. (US).

Authorship: The authors and coauthors should have active contribution to conception design, analysis and interpretation of findings. They should critically review the contents and drafting of the paper. All should approve the final version of the paper before submission

The Global Journals Inc. (US) follows the definition of authorship set up by the Global Academy of Research and Development. According to the Global Academy of R&D authorship, criteria must be based on:

- 1) Substantial contributions to conception and acquisition of data, analysis and interpretation of the findings.
- 2) Drafting the paper and revising it critically regarding important academic content.
- 3) Final approval of the version of the paper to be published.

All authors should have been credited according to their appropriate contribution in research activity and preparing paper. Contributors who do not match the criteria as authors may be mentioned under Acknowledgement.

Acknowledgements: Contributors to the research other than authors credited should be mentioned under acknowledgement. The specifications of the source of funding for the research if appropriate can be included. Suppliers of resources may be mentioned along with address.

Appeal of Decision: The Editorial Board's decision on publication of the paper is final and cannot be appealed elsewhere.

Permissions: It is the author's responsibility to have prior permission if all or parts of earlier published illustrations are used in this paper.

Please mention proper reference and appropriate acknowledgements wherever expected.

If all or parts of previously published illustrations are used, permission must be taken from the copyright holder concerned. It is the author's responsibility to take these in writing.

Approval for reproduction/modification of any information (including figures and tables) published elsewhere must be obtained by the authors/copyright holders before submission of the manuscript. Contributors (Authors) are responsible for any copyright fee involved.

3. SUBMISSION OF MANUSCRIPTS

Manuscripts should be uploaded via this online submission page. The online submission is most efficient method for submission of papers, as it enables rapid distribution of manuscripts and consequently speeds up the review procedure. It also enables authors to know the status of their own manuscripts by emailing us. Complete instructions for submitting a paper is available below.

Manuscript submission is a systematic procedure and little preparation is required beyond having all parts of your manuscript in a given format and a computer with an Internet connection and a Web browser. Full help and instructions are provided on-screen. As an author, you will be prompted for login and manuscript details as Field of Paper and then to upload your manuscript file(s) according to the instructions.



To avoid postal delays, all transaction is preferred by e-mail. A finished manuscript submission is confirmed by e-mail immediately and your paper enters the editorial process with no postal delays. When a conclusion is made about the publication of your paper by our Editorial Board, revisions can be submitted online with the same procedure, with an occasion to view and respond to all comments.

Complete support for both authors and co-author is provided.

4. MANUSCRIPT'S CATEGORY

Based on potential and nature, the manuscript can be categorized under the following heads:

Original research paper: Such papers are reports of high-level significant original research work.

Review papers: These are concise, significant but helpful and decisive topics for young researchers.

Research articles: These are handled with small investigation and applications.

Research letters: The letters are small and concise comments on previously published matters.

5. STRUCTURE AND FORMAT OF MANUSCRIPT

The recommended size of original research paper is less than seven thousand words, review papers fewer than seven thousands words also. Preparation of research paper or how to write research paper, are major hurdle, while writing manuscript. The research articles and research letters should be fewer than three thousand words, the structure original research paper; sometime review paper should be as follows:

Papers: These are reports of significant research (typically less than 7000 words equivalent, including tables, figures, references), and comprise:

- (a) Title should be relevant and commensurate with the theme of the paper.
- (b) A brief Summary, "Abstract" (less than 150 words) containing the major results and conclusions.
- (c) Up to ten keywords, that precisely identifies the paper's subject, purpose, and focus.
- (d) An Introduction, giving necessary background excluding subheadings; objectives must be clearly declared.
- (e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition; sources of information must be given and numerical methods must be specified by reference, unless non-standard.
- (f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;
- (g) Discussion should cover the implications and consequences, not just recapitulating the results; conclusions should be summarizing.
- (h) Brief Acknowledgements.
- (i) References in the proper form.

Authors should very cautiously consider the preparation of papers to ensure that they communicate efficiently. Papers are much more likely to be accepted, if they are cautiously designed and laid out, contain few or no errors, are summarizing, and be conventional to the approach and instructions. They will in addition, be published with much less delays than those that require much technical and editorial correction.



The Editorial Board reserves the right to make literary corrections and to make suggestions to improve brevity.

It is vital, that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

Format

Language: The language of publication is UK English. Authors, for whom English is a second language, must have their manuscript efficiently edited by an English-speaking person before submission to make sure that, the English is of high excellence. It is preferable, that manuscripts should be professionally edited.

Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than $1.4 \times 10^{-3} \text{ m}^3$, or 4 mm somewhat than $4 \times 10^{-3} \text{ m}$. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

Structure

All manuscripts submitted to Global Journals Inc. (US), ought to include:

Title: The title page must carry an instructive title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) wherever the work was carried out. The full postal address in addition with the e-mail address of related author must be given. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining and indexing.

Abstract, used in Original Papers and Reviews:

Optimizing Abstract for Search Engines

Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art. A few tips for deciding as strategically as possible about keyword search:



- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

Tables, Figures and Figure Legends

Tables: Tables should be few in number, cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g. Table 4, a self-explanatory caption and be on a separate sheet. Vertical lines should not be used.

Figures: Figures are supposed to be submitted as separate files. Always take in a citation in the text for each figure using Arabic numbers, e.g. Fig. 4. Artwork must be submitted online in electronic form by e-mailing them.

Preparation of Electronic Figures for Publication

Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs) : >350 dpi; figures containing both halftone and line images: >650 dpi.

Color Charges: It is the rule of the Global Journals Inc. (US) for authors to pay the full cost for the reproduction of their color artwork. Hence, please note that, if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a color work agreement form before your paper can be published.



Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.

6. AFTER ACCEPTANCE

Upon approval of a paper for publication, the manuscript will be forwarded to the dean, who is responsible for the publication of the Global Journals Inc. (US).

6.1 Proof Corrections

The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

Acrobat Reader will be required in order to read this file. This software can be downloaded

(Free of charge) from the following website:

www.adobe.com/products/acrobat/readstep2.html. This will facilitate the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof.

Proofs must be returned to the dean at dean@globaljournals.org within three days of receipt.

As changes to proofs are costly, we inquire that you only correct typesetting errors. All illustrations are retained by the publisher. Please note that the authors are responsible for all statements made in their work, including changes made by the copy editor.

6.2 Early View of Global Journals Inc. (US) (Publication Prior to Print)

The Global Journals Inc. (US) are enclosed by our publishing's Early View service. Early View articles are complete full-text articles sent in advance of their publication. Early View articles are absolute and final. They have been completely reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after sending them. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so Early View articles cannot be cited in the conventional way.

6.3 Author Services

Online production tracking is available for your article through Author Services. Author Services enables authors to track their article - once it has been accepted - through the production process to publication online and in print. Authors can check the status of their articles online and choose to receive automated e-mails at key stages of production. The authors will receive an e-mail with a unique link that enables them to register and have their article automatically added to the system. Please ensure that a complete e-mail address is provided when submitting the manuscript.

6.4 Author Material Archive Policy

Please note that if not specifically requested, publisher will dispose off hardcopy & electronic information submitted, after the two months of publication. If you require the return of any information submitted, please inform the Editorial Board or dean as soon as possible.

6.5 Offprint and Extra Copies

A PDF offprint of the online-published article will be provided free of charge to the related author, and may be distributed according to the Publisher's terms and conditions. Additional paper offprint may be ordered by emailing us at: editor@globaljournals.org.

You must strictly follow above Author Guidelines before submitting your paper or else we will not at all be responsible for any corrections in future in any of the way.



Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.



12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. Pick a good study spot: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.



27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.



Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

- Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

- Use standard writing style including articles ("a", "the," etc.)
- Keep on paying attention on the research topic of the paper
- Use paragraphs to split each significant point (excluding for the abstract)
- Align the primary line of each section
- Present your points in sound order
- Use present tense to report well accepted
- Use past tense to describe specific results
- Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives
- Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.



Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript-- must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As an outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.



- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently. You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.



Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- ~ Submit to generally acknowledged facts and main beliefs in present tense.



THE ADMINISTRATION RULES

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.
- Do not give permission to anyone else to "PROOFREAD" your manuscript.
- **Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)**
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.



CRITERION FOR GRADING A RESEARCH PAPER (COMPILATION)
BY GLOBAL JOURNALS INC. (US)

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

Topics	Grades		
	A-B	C-D	E-F
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



INDEX

A

Aberration · 4, 5
Abruptly · 10
Amidst · 48

D

Defuzzification · 9
Dempster · 2

F

Femtocells · 39

H

Hysteresis · 32, 33, 35, 36, 39

I

Inferential · 2

L

Legitimate · 48

P

Portsmouth · 29

S

Sdenotes · 36
Silhouette · 14, 16, 18

T

Truncated · 2

U

Unobtrusiveness · 15

V

Vulnera- Bilities · 1

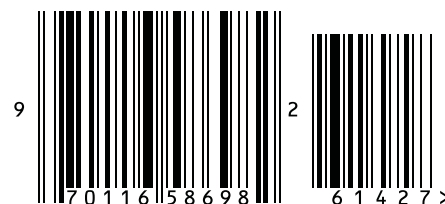


save our planet



Global Journal of Computer Science and Technology

Visit us on the Web at www.GlobalJournals.org | www.ComputerResearch.org
or email us at helpdesk@globaljournals.org



ISSN 9754350