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Online Criminal Record

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The project includes three phases. In the first phase, user chooses their tasks independently online through LAN. In phase two, user/police can search, modify, and update the criminal data at the server database. Server is capable of independently executing necessary client request. In phase three, the administrator can save the final criminal record and the client's results in the database. The project manages several servers, one for each laboratory. The project is intended to reduce the workload of the policemen/ investigators, managing the record. The project can be used in various departments.

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I. Introduction

India is very vast country. Different types of people lives in it. Many people travel from one place to another to fulfil their basic needs such as food, cloth, shelter. Keeping and maintaining the records of such people is a difficult task. Criminals take the advantages of such situation. They do the crimes and leave the place.

Hence it requires much more time for investigation. It increases the workload of the police. They have to travel to the related city for information. It takes few days or months for investigation.

As we are much more familiar with existing system. It is manual and work based i.e. a lot of paper work has to be done by the authority. We have to face many problems in the existing system which is manual as well. To overcome from these types of problems we need to change our system.

Our very first objective for designing this system is to computerized the existing manual system. This will not only speed up the process of searching criminal records, matching the criminal records, identifying criminals in a very secured way and also within a second of time but also reduce the paper work.

Developing centralized, computerized system and techniques to overcome the lengthy and traditional process of maintaining criminal records. The portal can handle data of criminals who are under the judicial surveillance or are under trial. This portal will be most useful for DEFENCE for searching of details of the criminals. Missing citizen search, secure registration and profile management facilities for detectives and security agencies.

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That we have to face many problems in the existing system which is manual as well. To overcome from these types of problems we need to change our system. Our very first objective for designing this system is to computerized the existing manual system. This will not only speed up the process of the searching criminal records, matching the criminal records, sending the files of critical case to the Judicial authorities in a very secured way and also within a second of time but also reduce the paper work.

There are also some other reasons behind the need of the new system. The existing system is fully manual and use paper i.e. a lot of paper work has to be done by the authority. Now a day, when computer is used everywhere then why not in the police stations. To make our police stations computerized the existing system doesn't help any more.

To do effective investigation of crime and criminal, the proposed system provide facility to use one of the biometrics technique i.e. fingerprint scanning and matching.

A fingerprint scanner has basically two tasks; to acquire an image of a fingerprint, and to decide whether or not this image matches the image of a previously enrolled fingerprint. The decision phase is done by extracting features from the image and then comparing these features to templates stored in a database.

A fingerprint contains a lot of information. Storing and using all this information, would take too much space and unnecessary effort while a lot of the information in fact is redundant. Instead, fingerprint scanners focus on the essential information to make the fingerprint as unique as possible and thus useful in identification and verification situations.

The key objectives of this project include:

a) Providing enhanced Information Technology tools for investigation, crime prevention, law and order maintenance and other functions;
b) Increasing operational efficiency by reducing manual and repetitive tasks (data to be entered only once which would automatically prepare all the registers).
c) Better communication and automation at the back-end.
d) Sharing crime and criminals' databases across the country at state and central levels.
e) Sharing intelligence on real-time basis.
f) Improving service delivery to the public and other stakeholders.

II. Working of Proposed System

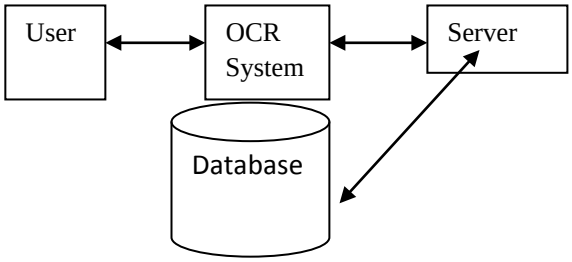

Figure 1: The System Structure

III. Algorithms Used

a) Pattern Recognition

Pattern recognition is a more global method for identifying fingerprints compared to minutiae analysis. It focuses on general flows and directions more than special points. Core points and delta points will appear clearly in the pattern, and be used for identification.

Pattern recognition operates by acquiring biometric data from an individual, extracting a feature set from the acquired data, and comparing this feature set against the template set in the database.

Pattern recognition is a more global method for identifying fingerprints compared to minutiae analysis. It focuses on general flows and directions more than special points. Core points and delta points will appear clearly in the pattern, and be used for identification.

During authentication, biometric information is detected and compared against the database through pattern recognition techniques that involve a feature extractor and a biometric matcher working in cascade.

An enrolment procedure is used to extract pertinent information from the fingerprint and store the information to a template (or feature vector) which then represents the user. When matching is based on pores, the template consists of vital information about these features. For pores, the position relative to a local reference point, size, and shape could be stored:

pore features: {(p1,m1,s1), (p2,m2,s2), ... (pPE,mPE,sPE)},

Where, PE is the number of enrolled pores, p is the position (defined as the centre of mass of the pore), m is the size, and s is the shape.

The method used to extract the pores as fingerprint features is critical to the matching routine.

The pore's position, size and shape are features which make it distinct from other objects in an image. Techniques used for the fingerprint data capture can be used to enhance the pore information.

A particular matching technique will produce a score representing the fraction of features matching between the enrolled and the live-scan prints. Generally, the number of features detected in the two different prints, NE and NC, will be different. Therefore, the matching routine must compare two sets, or configurations, with a different number of elements. For example, a pore match score, S_p, can be defined as:

$$S_p = \frac{2n_m - n_n}{N_T}$$

Where

N_T = (NE + NC) = total number of pores in both segments

n_m = number of pores that match

n_n = number of pores that do not match and using $n_n = N_T - 2n_m$,

The pore matching score, S_p, can be rewritten as:

$$S_p = \frac{4n_m - N_T}{N_T}$$

A match occurs when a pore is detected in the comparison image at an enrolled pore's location. A mismatch occurs when a detected pore from either image does not correspond to one from the other image. Based on SP, a decision is made to accept or reject the claimed identity of the user.

b) Minutiae Algorithm

Minutiae-based techniques first find minutiae points and then map their relative placement on the finger.

Minutiae matching to be effective the input fingerprint should be registered to the template fingerprint using the minutiae information of both the fingerprints. After registration the minutiae sets are compared using the spatial distance, which must be smaller than a particular threshold for two minutiae to be declared as matched.

A minutiae *m* is described by the triplet *m={x, y, θ}*, where *x, y* indicate the minutiae location coordinates and θ denotes the minutiae orientation, which is the orientation evaluated for the minutiae location from the orientation image obtained during the enhancement process.

Let T and I be the representation of the template and input fingerprint, respectively. Let the minutiae sets of the two fingerprints be given by:

$T=\{m_1, m_2 \ldots\ldots, m_m\}$ m_i = $\{x_i, y_i, \theta_i\}$, i=1..m

$I=\{m_1, m_2 \ldots\ldots, m_n\}$ m_j = $\{x_i, y_i, \theta_i\}$, j=1..n

A minutia *mj'* in I and a minutia *mi* in *T* are considered to be matched if their spatial and orientation differences are within specified thresholds *ro* and θ*o*. The matching algorithm returns a percentage match score, which is then used to take the match-no match decision based on the security criterion.

Minutiae extraction was carried out using the crossing number approach [39]. Crossing number of pixel '*p*' is defined as half the sum of the differences between pairs of adjacent pixels defining the 8-neighborhood of '*p*'.

Mathematically it is expressed as,

$$Cn(p) = \frac{1}{2}\sum_{i=1..8} |val(p_{imod8}) - val(p_{i-1})|$$

Where *p0* to *p7* are the pixels belonging to an ordered sequence of pixels defining the 8-neighborhood of *p* and *val (p)* is the pixel value.

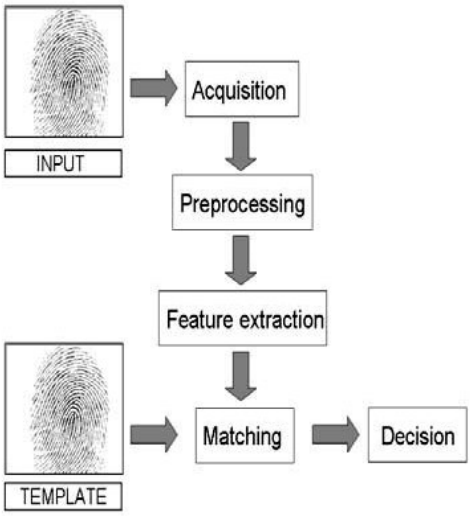

Figure 2:

IV. Expected Results

The input to the system is the information about criminal and fingerprints of the criminal which result into the excepted fingerprints and the record of the criminal whose fingerprint matches with input fingerprints.

V. Conclusion

We can implement a system for investigating crimes by keeping their record in less time and which reduce human effort. The system will be centralized, to store data which makes easy access.

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