An Application Development for Record Keeping of Police Stations in Pakistan

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The Police and Police stations have its adequate importance all around the world in this era where the crime rate is very high, the situation of Pakistan is also same. Currently, the police stations in Pakistan are utilizing the old method (hard paper) of FIR registration and which requires extra effort to maintain the record of criminals and to trace someone's record also require unnecessary time which can be saved by digitizing the police stations records. Although, some police stations do use digital record keeping in Excel sheets but the Integrity problem is noticed in file based record also the access is slower for searching single record the officer/official has to go through all the records in the sheet which consumes extra time. The excel sheets can only be used by a single person at a time and also they do not have any security mechanism, anyone who has access to the computer can easily access the sensitive record. To overcome these issues we have developed an application for the police station to digitize the method of FIR system and other important official records about the staff and necessary registers used by police stations

Introduction

The importance of police in the society cannot be denied in terms of the safety they provide to the people all around the world. The main responsibility of the police is to maintain the law and order situations in the country and restrict the criminal activities in the society by bringing the criminals into court for justice through proper investigations. For the proper investigation it is important to solve the complex criminal cases and prove the truth in the court which is quite a complex process and requires a lot of effort [1]. Every country has its own method of the investigation, but the situation of Pakistan in this matter is worse. The progressive countries are using different modern techniques for the crime prevention and investigation purposes, these technologies can be categorized into hard and soft technologies. The hard devices include metal detectors, CCTV cameras and walkthrough gates. In soft technology, the face recognition and fingerprint recognition software's are used. Here the quoted are few but these can not be limited to the mentioned here [2]. In Pakistan, there are not prominent investigation agencies that conduct the investigation the police is responsible for investigating the cases at various levels. The laboratories also play an important role in identifying the facts and in this connection around 1930 first laboratory was established in Lahore in a photographic section of criminal investigation department. The laboratory is serving/dealing with the examination of different pieces of evidence like cloths, fibers, dust, coins, forged currency, handwritten material, secret inks etc. [1]. The police have no advanced weapons they are not using the advanced technology for the prevention of crimes. The Khyber Pakhtunkhwa's police system has been much improved since few years by utilizing the information technology techniques which has also reduced the crime rate as compared to the other provinces [3]. The process of investigation starts when some citizen (victim) registers FIR against accused (criminal), the first step of investigation is mostly gathering proofs either the incident claimed by victim happened in real or not and on the basis of proofs the police arrests criminals for further investigation from them. All the proofs are recorded on a paper for presenting to the court for further processing of the case in the court [1].

The investigation methods can be different on the basis of nature of the crime. The successful investigation is directly dependent upon the information gained from different peoples which help for arresting the criminals that destroy the peace of society. These issues are almost same in the other countries also as reported by Ladapo in [4], about the issues faced in the Nigeria during the investigation of criminal cases. The use of technology is increasing day by day to make the human life easier.

The police have not been provided the modern technology facilities and the record keeping is not computerized which reduced the efficiency of police stations. The advanced countries like the United States have provided the facilities of modern technologies for crime management and investigation which has enhanced the performance of the US police [5]. The computers and software's are been used in different organizations for record keeping, so intelligent software systems should be implemented in the police department to decrease the extra effort and motivate the police personals to work more with little effort and to save their valuable time.

In this study, we have tried to develop a software for the police department keeping in view the limitations of already developed software [6]. The main function of the software is record keeping of criminals who have been arrested in the particular police station, to be arrested or escaped [7]. The software also maintains few important records (registers) of the police station, we will

further extend this project to cover all the registers. The developed software will fulfill the need of record keeping of the police department in an organized manner. The investigation process starts with the complaint of civilian when some incident occurs, a Complainer reports a First Information Report (FIR). After the FIR, the police start investigation process to find the truth and tackle the case according to law. The investigation is carried out by an investigation officer [8] [9]. The main role in the investigation process is of Petitioner (complainer), Victim, Accused, and investigation officer [7]. The information we have collected from the police station of Islamabad, Pakistan about the registers and their entities and other necessary information about the FIR and its steps needed for the development of software. Furthermore, we have also referred the web (http://kppolice.gov.pk/PoliceModernization/) for identifying the entities required and officers involved in the investigation process. Further, we have reviewed literature for the purpose to know how much the other countries are advanced than Pakistan and which technology they are using for the crime investigation.

The remainder of this paper (report) is structured as follows: section 2 provides a literature review. Section 3 gives motivation for choosing the topic. Section 4 presents the scope and background of the proposed work in details. Section 5 describes the specification and design of the proposed system for investigation and crime management. In Section 6 conclusion and future work are provided.

Literature Review

The literature review has been carried out to draw a border line between the researches done in this area by other researchers and also to observe how much the rest of world is advanced than Pakistan.

Ping and Tao [10], discussed the issued faced during the development of the criminal investigation expert system (CIESs), they have particularly focused on the cooperative intuition learning system (CILS). The use of artificial intelligence and expert systems has successful in different fields like medical. The researchers are trying to transfer the human intelligence into computer intelligence, to overcome the shortage of experts and to make fast decision making.

Hekim, Gul, and Akcam [11] have carried out across the sessional study in the U.S Department of Police. In order to find out the impact of information technology techniques on the investigation and truth finding process. They have focused on the hypothesis that: "As law enforcement agencies use of information technologies for investigative purposes increases, the number of crimes cleared by those agencies also increases." They have ended with not significant results due to unbalanced data for the survey.

Dzemydiene, Kazemikaitiene, and Petrauskas [12] have considered the methods of Knowledge representation for the efficient crime investigation and maintenance of the records of criminals. They proposed unified advisory consultation system in law enforcement to boost the decision making in the most complex crime cases. They integrated different databases that will help for crime analysis.

Shen et al in [13], proposed scenario-based decision support system for the crime investigation using Bayesian Network. The proposed method constructs the possible number of scenarios and hypotheses and uses the Bayesian Network for the evaluation of the evidence and on the basis of that creates strategies to collect the more evidence. The decision support system will assist in the investigators to make decisions in uncertainty and will optimize the information acquisition strategy.

Kester in [14], proposed computer added method for the investigation of crimes with the analysis of mobile conversations data using the concept of Lattice Theory's data analysis method Galois Lattices, and propositional Calculus. The data was divided into common and distinct attributes the categorization has done on the basis of related data with respect to the time and events.

Falaye, Adama, and Agemerien [15] have developed Biometric based system for the identification criminals and investigation of criminal cases. They have used fingerprints as biometric. They have tried to overcome the disadvantages of the manual system of record keeping, which cause unnecessary delay in the investigation process.

Kuo, Lin, and Springsteel in [16], proposed an expert system based on the mark theory for reconstructing the crime scene. The system checks the legality of each premise through the identification and individualization tests. They have tried to implement the concept and implementation of fuzzy subset theory to reconstruct the crime scene for better investigation, they have emphasized on the machine learning techniques to achieve the desired goal.

Muramatsu et al. in [17], created a gait verification system for the crime investigation. The system was designed for the investigators that can get help from the system to identify the criminals. This system will work on the basis of the footage captured during the some incident happened, for example, robbery in the bank, the features of that footage will be extracted and compared with the features extracted with proposed gait verification system the system will calculate the probability and make a decision on the basis of matching ratio.

Naseem et al. in [18], developed application for the criminal record keeping our project may resemble with their project because the entities of tables are same further the project they have developed has some problems which we improved in our project. We have divided the accused and victim tables further so that we can add details of more than on victim and accused in the FIR because it is not necessary that in single FIR only single person got affected, most of the times the crime has committed by more than one persons in the gang. Further, we have added more tables of complainer and witness into our developed system. The developed system is more efficient and the deficiencies in the previous systems have been removed and further improvements will be carried out by time to time.

After going through some literature review, to get motivated, to continue with the project and improve the previously proposed projects so that the applications can be properly utilized in the police stations of Pakistan as no such effort has been done in Pakistan to develop the application for police stations [24] [25] [26]. The important points that motivated us to develop an application for police stations are given in the upcoming section.

Motivation

The development of reliable and efficient software products,

which fulfill the record management requirements, can be effective for the police department. The idea of developing this kind of software is to provide fast and reliable software for strong data management of police station. The designed system is fully network based as software based on Microsoft SQL Server 2008, MS SQL Server 2008 provides built-in support for the network libraries and protocols they can communicate on the network, the big beauty of MS SQL Server is that all network based work is hidden for the communication we have taken full advantage from Microsoft Technology by using .Net Framework and SQL Server 2008 [18].The developed application is special purpose software designed for police stations. The main object of this software is to provide secure and efficient management of records in police stations. We have designed distributed database system for the police station for maintaining different police related information such as police stations record, criminal records, officer and officials record at a rapid pace, this software has replaced these registers because they have a lot of disadvantages. The cybercrime investigation techniques can also be helpful in the investigation process [19].

The Existing system is a computerized in major police stations but they maintain the records in excel sheets, to access information from excel requires extra time. The maintenance of record in excel sheet is quite difficult and also duplication of data do exists, as the integrity of data is also important so excel sheets are not reliable to be used in the sensitive department of police. To acquire information about the particular F.I.R the police has the search all the records. The excel sheet can only be used by a single person at the same time, also it do not employees user privileges and anyone can see and search the information without any security check [1].

Shortcomings of Manual System

1. The general complaints or criminal reports are managed manually.
2. The documentation of records is taken on paper that have no guarantee to survive. The paper has certain expiry time after that it gets spoiled.
3. The external environmental factors also destroy the paper like liquid, fire. Many cases of the fire have been reported in Pakistan and all around the world where the most important record has been burned and vanished.
4. Sometimes the peoples who are against the success of company also involves in offenses to demolish the paper based record.
5. Some officers burn the record to clear the record of their corruptions or to favor the criminals.
6. The paper-based record has no backup to recover the important data.
7. The access of file based record is much slower and it requires extra unnecessary effort and time.
8. The paper-based record needs at least one dedicated person who can manage the registers and also trace the data if required.

Benefits of Computerized System

1. The general complaints or criminal reports can be managed within a single database.
2. The paper based register will be replaced with a single computer.
3. The computerized record has backup facility and can be kept for whole life with less consumption of memory. If the record got deleted intentionally or accidently can be recovered easily with few steps.
4. The computerized data is much reliable and any tampering can be easily detected from log.
5. The digital record can be easily accessed with a simple search within seconds. The access time of digital systems is way faster than the paper-based systems.
6. The data will be available all the time.
7. The digital systems are efficient.

Scope and Background of The Work

In this section, we try to develop a background of study and discuss the current registers which are used by the police stations for record keeping.

The Current Situation

There is no computerized database system for management of police records but there are different manual paper-based registers those are used to maintain records.

Currently, various registers are used in the police stations the names of registers may change from area to area, but the purpose of them is similar. In the developed application, do not cover all the registers because it takes a lot of time so we will accomplish the development task into different segments in this application we will cover the most important registers as given under [20].

1. F.I.R. Book
2. Inward and Outward (DAK Registers)
3. Officer Record

The description of each register is given as under:

F.I.R. Book

The crime report is known as First Information Report (FIR). The crimes are categorized into two types one in which the crime is clearly recognizable in that case the FIR would be lodged in the book and on the basis of that investigation will be carried out by police. In the second case if the crime is not clearly recognizable then the FIR will not be directly lodged in the main book, it will be lodged into the second concerned book. The FIR has adequate importance in the law of Pakistan it a document on the basis of which the criminal cases are investigated and a clue of the truths are found [1] [20].

The on the basis of crime types the First Information Report (FIR), is divided into two parts as F.I.R. and Challan.
F.I.R. Form
In this part, the recognizable crimes are entered. This part comprises so many columns [20].

1. Date and time of report
2. Name of complainer
3. Fathers Name
4. CNIC
5. Short description about crime and the Act Number which is applicable
6. Place of crime

Challan Form
In this part, the crimes are challaned. This part is called challan

form in simple words. When a criminal is arrested by police then the responsibility of police starts and first step after case challan is to present the accused into the court within the certain time period which is mostly 12 hours [20].

1. Complaint name
2. Accused
3. Name of witnesses
4. Description of Crime

Inward and Outward

The purpose of this register is to maintain the record of received and sent letters/ warrants/ notifications etc. These registers are mostly used in other Government Organizations as well for the record of the Inward and Outward correspondence (in simple words DAK). These two registers can be merged into single registers but for easiness the police stations use two separate registers for this purpose (In the developed system we have merged these two into single register). Currently the police stations have divided this register into two main parts according to their functionality i.e. Inward Correspondence Register and Outward Correspondence Register.

Inward Correspondence Register

The Inward Correspondence Register is used to keep the record of those letters/notices received/arrived from other connected departments or offices. E.g. D.P.O Office.

Outward Correspondence Register

The Outward Correspondence Register is used to keep the record of those letters/notices sent to other connected departments or offices.

Officer Record

In this register, the basic information about the officers and officials posted at the police station are maintained. The information can be personal details about the employees, employment record etc.

Specification and Design of Proposed System

This section describes the overall design of the proposed system for the police station digital record [21].

Presentation Layer

The presentation layer is divided into following files/Forms.
1. Log in Form
2. Main Form
3. Crime Head Form
4. Inward Register Form
5. Outward Register Form
6. Police Stations Form
7. Crime Register Form
8. Police Officer Form

Log in Form

The Login form asks for the username and password and upon successful username and password combination the user moves to the main form and with three wrong username password attempts the system automatically blocks for 10 minutes after generating an alert. This feature enhances the security of the system and protects from unauthorized access. The login form was tested by generating different test cases on the basis of (both negative and positive test cases) wrong and correct combination of the username and passwards and the identified bugs were removed.

Main Form

The main form contains the main menu where the menu list is provided as well as the buttons for each form so that the user can easily navigate through the system and access the forms with one click. The main menu also contains search bar from where user can search directly by entering an FIR number or the CNIC number. The search results will be displayed in the grid. The advanced search button is useful in special cases where the FIR No, and CNIC numbers are not known in that case the user can search any record by name,age, fathers name or the other attributes.

Crime Head Form

The head is mostly used in the Government Organizations to identify particular thing like the budget of the country is divided into different heads i.e. Development, Education, Health etc. Similarly the crimes ares identified with crime head. The crimes in the form of list will be saved into the crime head table through crime head form so that at the time of FIR lodging the time of re-entering the crime head again and again can be saved. The crime head can be selected from the list box and in the table at back end the description of the crime and possible punishment will also be stored.

Inward Correspondence Register Form

The user can store the received letters from higher authorities and other offices and instructions from the inward form by providing the details and pressing add button. Like received from, date received subject of the letter and other necessary information this form also contains search option to search particular record in the database.

Outward Correspondence Register Form

The user can store a record of sent letters from the police station to higher authorities and other offices from the outward form by providing the details pressing add button. Like sent to, date sent subject of the letter and other necessary information.

Police Stations Form

The Police Stations form will be used to store the information about the police stations present in the area and also the information about the officer of that police station with office contact number. This will help to contact the other police stations easily in case of some emergency or other law in order situations.

Crime Register Form

The crime register is the most important form of the investigation and crime management system. It focuses on the Fir register where the FIR is registered against the accused. The accused can be many so grid view is used to make multiple entries possible same is the case in victim also. The user can select police station, head and investigation officer from combo boxes. This saves the time of typing again and again.

In all forms, the user can clear screen, add new record update any record, delete the record and can see the stored records from the list box.

Officer Record Form

The employee register stores all the details of officers and officials. The officials will be responsible for managing the registers. This register will keep the record of police officers and through the system it can be easily identified which police officer served at particular police station and during which time period, like some officer, served from 2002 to 2015 at Islamabad police station it can be easily traced from the system also the case

history can be easily traced. The officer forms do not contain the normal search option only user can search through advance search option.

Logical Layer

ADO.NET is used for Business logic layer by using Datasets, data table, and table adapters. ADO.NET Connects the VB.NET Forms with SQL Server by the help of Dataset and Table Adapters.

Database Layer

The database we have created using SQL server 2008 at the backend. The database is divided into different tables as given under.

1. Crime Head
2. Police Station
3. Crime Register
4. Accused
5. Victim
6. Officer Record
7. Complainer/petitioner
8. Witness

Database Entity Relationship Diagram

Figure 1 given bellow is the main ER Diagram of the developed system. The tables in single diagram become complex that's why we have divided the figures further so that the relationship between the tables can easily be understood. The main table or the backbone of the system is crime register. The database is developed by carefully observing the need of the police and police station. The victim and accused tables are divided into two different tables because in a single criminal case the victim and accused can be more than one. Further, the complainer table is also added keeping in view of the critical crimes like murder in that case the victim cannot lodge FIR, so that the relative of the victim can lodge the FIR. These tables contain most common entities that are required for an FIR. In the entire database, these four entities are most important i.e. Victim, Accused, Investigation Officer, and somehow Complainer or Petitioner and Witness.
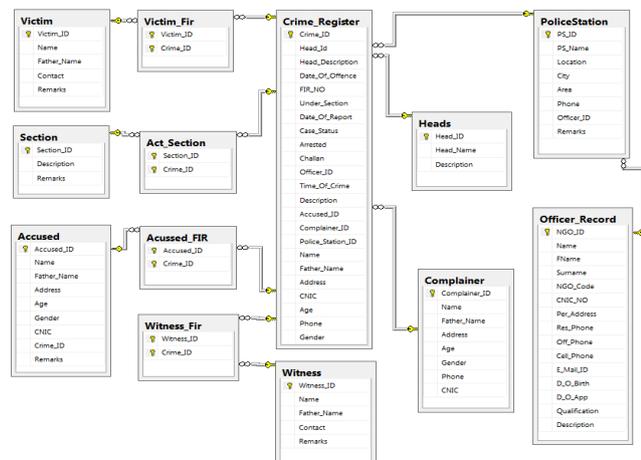
Fig. 1. Entity Relationship Diagram of the development system. The relationship of the tables is quite clear from the figure that's why we will not discuss it further in this report.

Discussion

The FIR number will be automatically assigned to every FIR registered in the system which is unique and every FIR can be searched through FIR number. The investigation process depends upon that FIR number, every complainer has to keep the number of FIR with himself for any correspondence with the investigation officer.

The mandatory fields required for FIR are identified and implemented in the system as every system has few optional and mandatory fields. The developed system also contains optional fields which the user can leave blank like phone number, email it is not necessary that everyone has email id and phone number as well so we left this kind of fields as optional fields.

Like other systems, we have denoted the mandatory fields with an asterisk for the easiness of the user of the application.

The details of other registers are not included here and the main figure of crime register in the developed application is included, because including every figure will make this paper more complex and lengthy.

The multiple entry fields are implemented through the grid, the multiple fields are victims, accused, and witness in these forms user can add more than one entries against the FIR. The multiple fields are included due to the actual need of the system because in single FIR the accused persons can be more than one also the same is with witness and victim. These multiple field were not included in the previous developed systems found in the literature.

The system has the capability to edit delete and updates any entry so that a wrong entry may be removed and if some accused victims and a witness identified later may be easily entered into the FIR through the update option.

Snapshots
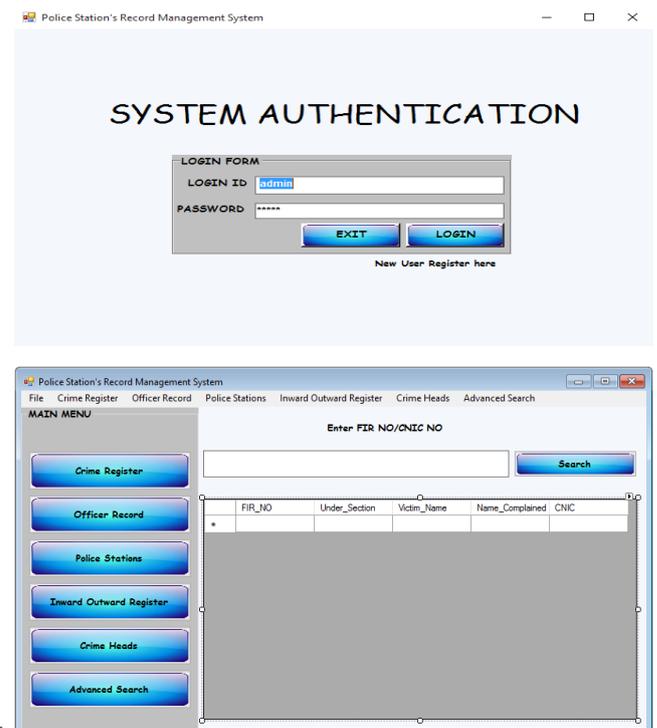
Conclusion and Future Work

The developed system will help a lot to maintain the record of police station although it is not a complete system still some improvements are needed in the developed components and need to add some additional necessary components. Further, all the registers are not digitized, this system covered few important registers which have more use in daily routine crime cases and are most frequently used. This system can be taken online by implementing the front end application in the ASP.NET. This would make the data easily available from anywhere round the world which can be useful for the police stations and other security agencies through restricted acess. In future we will enhance the functionality and features of the system, and will add the functionality to connect the system with the Internet and National Database and Registration Authority (NADRA) for the rapid matching of the fingerprints and other important symbols like offline signature verification which can also be used as identification of criminals specially in legal and financial fraud cases where the accused has created forgery signature of the victim [22], [23]. This can boost the investigation and decision making. The NADRA's Database is already being used for the purpose of passport verification, arms license verification, voter list verification, etc. so it can also be connected with the police stations of the country and can be used for the criminals identification and investigation purposes. This connectivity will create a problem that every user of this application can access the NADRA database and wll create the problem of confidentiality of data to avoid that we will limit the connectivity with NADRA database to authorized officers only the other users will not get access of the NADRA database. It is concluded that the developed software is efficient, reliable, portable and user-friendly and can be easily implemented in police stations as a trial basis and further improvements will be made after identifying the bugs in the software.

Notes And References

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