

Real Time Crime Mapping for Delhi

Abstract :-

The capital city of India has been blatantly termed many times as the crime capital of India based on the reports depicting the sharp rise of crimes on various occasions throughout the city. But crimes in Delhi are no more limited to scattered incidents caused by outsiders/ terrorists; instead *it is more about the city's socio economic imbalances, lack of education, urban anonymity, disproportionate gender ratio, overpopulation, unemployment, poverty, corruption, inadequate policing, deteriorating moral values, loopholes in legal systems etc. And rapid urbanization too has led to certain factors which certainly have a bearing on the crime rate in the city.*

Thus to tighten noose on crimes happening across the city, this idea proposes a smart solution to monitor the city-wide crime situations via a real-time intuitive crime map which can pinpoint the crime hotspots in areas across the city. Therefore, enabling the policy makers, security officials to get a firm grip on crime scenarios, to take strategic governance initiatives and as well as raise awareness among the citizens on the whereabouts of crime that took place.

Problem Description :-

Delhi has been grappling with the problem of a variety of crimes - murders, communal riot, kidnapping, abduction, rape, street crime, hate crime, honour killing etc.

In the year 2013 and 2014, number of rape cases shot up significantly and tripled within a year of the "Nirbhaya" rape case. In the year 2014 we witnessed an almost doubling of crime with crime rates soared up by 99.22%. For the first time in history in the year 2015, Delhi has earned infamy of being officially termed as the "rape capital" of India according to NCRB (National Crime Records Bureau) reports. A report released by the NCRB also stated that Delhi is one of the top four crime affected cities in India.

The highest number of cases are reported of vehicle theft and snatching. Large expansion of new colonies and thousands of unplanned colonies is an important factor for street crimes such as robbery and snatching. Although significant decline in crime rates in Delhi for the year 2015 had brought us a ray of hope.

But still, to eradicate crimes at grass-roots level, this city needs sustainable plans to combat a variety of crimes. And this proposed mobile app can give the law enforcement agencies, policy makers, citizens of Delhi an intuitive glimpse of real-time crime scenarios across the city.

Solution :-

1. **Crime Map** : A comprehensive, real-time, color code based map of city-wide violence - Crime Mapping allows commoner/ policy-makers/ security-officials to explore crime in user's neighborhood/ across the city with reliable reports that come directly from the local law enforcement agencies.

We have roughly categorized the target audiences who can get benefits from the app into four types – 1) Commoner, 2) Private-enterprises, 3) Policy-makers, 4) Law-enforcement agencies. **This map wil provide different layers of visibility to different target audiences.**

View of map for policy-makers & law-enforcement agencies -

These audiences can view all sources of officially registered/ crowd-sourced (verified/ non verified) crime reports with exact address locations in detail & information on user who has reported the crime (if crowd-sourced). Tap a record bubble to see -

- What – details of a crime and links to related media if any.
- Where – the exact location (latitude & longitude) of an incident.
- When – time-stamp.
- How – a brief summary of in which popular ways this kind of crimes are taking place.

They will also have access to the “view of map for commoner & private-enterprises”.

View of map for commoner & private-enterprises -

- **These audiences can view a color code based map of city-wide violence.** They can zoom in to see region based crime statistics. People can type in postcodes/ street-names/ areas, can choose type of crimes, can even specify a range of time, can choose a circle of interests to get the crime statistics on the map or in a list format and also can compare it to other parts of the city.
- The map does not contain record bubbles to pinpoint to a particular crime location. Rather it **provides a summary of crime happened in a particular region, time & in which popular ways this kind of crimes are taking place.**
- A stream of tweeted crime reports posted by citizens (& verified by authority) from the official twitter page for reporting crimes.
- A stream of subscription based crime warnings and suggestions via in-app/ email/ sms notification.

Common features available for all types of audiences -

- Different icons to show different type of crimes and different colors of icons to show different sources of crime data.
- **This map will put police stations, registered security agencies, verified NGOs, location of PCR vans as safe places along with their detailed emergency contact info on the map. So that anyone on urgent basis can reach the same.**

2. Reliable source of data & crime reporting : Data shared by law enforcement agencies those are registered with the app. There will be a web interface for the back-end server. Safety agencies can register themselves via web interface and share database. This app can also be integrated with official Delhi Police website which offers facility of e-FIR for some type of crimes eg- vehicle thefts. This data can be automatically fetched and incorporated into the map. **Bubbles with red colour will show the crimes officially registered by police.**

But static data can not prevent the crime in progress. There may arise a situation where a victim faces inconveniences to report crime on proper time or a witness wants to report any ongoing crime incidence directly to the security officials. Reporting of crimes can be done in the following ways -

- Emergency options will include list of numbers to call when in an urgent situation. A call can be placed through app and victim's/ witness's location can be shared to the authority.

- In a less-emergency situation user can type the details of crime, add picture/ audio/ video files and can share location to send crime reports directly to the law enforcement agencies. **This will be reflected into crime map as non verified crowd-sourced reports in different colour only to the policy-makers and security officials. It is the responsibility of security agencies to promptly verify the authenticity of report content, remove/ mark inauthentic reports and incorporate verified crime reports into the map for citizens' sake.** However if a report proved to be false as verified by local sources, authority must take strict action against the user who spread it.
- **Leveraging the power of crowd-sourced data :** Delhi Police can encourage the public to report any crime on an official twitter account for crime reporting Delhi Police with hashtags in a specific format, share crime locations, reports may include photos, videos or geo-tagged media captured on smartphones or by any other devices, thus providing more valuable data to the safety organizations. **This mobile app will capture the crime data from the twitter page and will incorporate the verified content into the map in orange/yellow colour (to distinguish it from the officially registered data).**

If the already verified crime report tweets do not contain sufficient information to be put on the map (eg- does not contain exact location/ is not posted in a specific mappable format), it can be shown as in-app stream of notifications to the user.

Thus by adding layers of visibility to the crime map, filtering out inauthentic crowd-sourced content from the map and by making the reliable crime data as publicly available in intelligible manner, the city can harness the power of crowd-sourcing in effectively combating any kind of ongoing/ future crime-scenarios without raising any concerns about privacy/ safety/ reliability issues.

3. **Crime Search :** Crime search based on various criteria -

- Area/ address based
- Range of time based
- Type of crime based
- GPS location based search to find crimes in neighborhood. User can specify scale of radius to choose circle of neighborhood to be searched. User needs to share his/her GPS location to avail this feature.

4. **Subscription based alerts:** At the time of signing up for the first time (via mobile-app or via official app website) user needs to fill details including name, mobile number, email id, residential address, username, password etc. If a user subscribes for safety alerts, she/ he may get it in one of the following ways -

First, user needs to choose a list of regions based on interest.

- a. **Smartphone user**, will get safety alerts via in-app/ email/ sms notifications..
- b. **Non smartphone user** will get sms safety alert on the registered mobile number.

5. **Rate safety levels :** Rate the safety level of areas across the city based on data. Since through this app we can have registered crime reports as well as crowd-sourced crime reports, we may use this data to analyze meaningful crime trends.

We can calculate various parameters for eg- *overall crime rate, a particular type of crime rate, number of crimes per unit area or number of crimes per 1000 citizens etc.* With those statistical parameters it becomes easier to rate the safety levels of regions in the city on a particular scale.

- Policy-makers, security officials can gain insight on city-wide crime scenarios.

- Citizens can get an overview of crime prone areas in the city too. For eg- user may wish to discover the lowest crime neighborhoods in any city or town, before he buys a property or site a facility. He may be interested in comparing areas based on crime statistics.

Key Implementation Challenges :-

a) This map depends on crowd-sourced data and in-app emergency call facilities for getting information on ongoing crimes those are not yet reported or officially registered . Thus police can enforce stringent rules to punish users spreading false reports.

b) Reliability of information is achieved through the sources of local law enforcement agencies. Agencies must be very proactive and careful to update the shared database in timely manner by accessing details of freshly registered crime events across the city. It is the responsibility of security agencies to promptly verify the authenticity of crowd-sourced report content, remove/ mark inauthentic reports and incorporate verified reliable crime reports into the map for citizens' sake.

Estimated Cost :-

Initial setup cost :

1. Cost of developing the mobile app,
Designer - designing the interface for the usability of app
Developer - The programming or coding part by a technology professional
2. Setting up the server side architecture.

Maintenance cost :

1. Server side maintenance – cost for app server admin
2. Project management, server hosting costs and cost for QA analysts.
3. Subsequent cost for server-side enhancements and app enhancements.
4. **Cost due to email notifications/ sms based security alerts** - This heavily depends on the complexity of the app, numbers of users that using the service and of course how much network traffic the app will have.

For example-

- i) If the initial setup cost for design, development of mobile-app and server side architecture takes in the range of 12-18 lakhs per annum
- ii) A typical server hosting cost on amazon can be of the order of \$ 0.150 or ~11/- per month which is negligible. Cost due to network bandwidth/ sms based security alerts - heavily depends on the complexity of the app, So overall we can assume 2 lakhs per annum for this.
- iii) Training workforce and employ them for testing the mobile app, compile data & create reports, accommodate incremental changes to make the app running can approximately take 10-12 lakhs.

So, roughly a total of 24-32 lakhs can be the estimated cost.

Community that will help & expected impact :-

Encourage the engagement of neighbourhood community in combating crimes - great app to monitor the neighbouring community and extend helping hands to the victim, for eg. user may notice increased number of car thefts in his/her locality in recent times and accordingly can take precautions.

It allows the public to stay up-to-date on local crime information and communicate crime information, unsafe conditions directly to law enforcement agencies.

User can get warning and suggestion related to safety measure while visiting a crime prone area and can reschedule outdoor plans/ take precautions accordingly.

Strategic awareness campaign – by observing maps policy-makers can analyze the highly affected areas/ hotspots in crime map and devise strategies to curb variety of crimes in sustainable manner.

- Intelligence led policing and strategic patrolling to reduce overall crime and disorder.
- Supporting pattern and trend analysis of crimes and forecast future crime occurrences. Prevention is the best strategy to deal with future crimes.
- Developing plans for special crime abatement team to address regional or seasonal hotspot locations.
- Strategically bringing spotted red zones under special governance schemes.