# Self-Learning Location Safety Index prediction based upon Crime rate analysis and Group-Aware Feedback

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# Why this project?

- Safety is a primary matter of concern while travelling or transportation.
- Kidnapping has increased by 47.80% (from 5,261, a rate of 1.40/100,000 in 1953 to 23,991, a rate of 2.07/100,000 in 2006). It was 77237 in 2014.
- 18,456 robbery cases were filed in 2006. The figure went upto 38071 in 2014.
- Rape cases are becoming increasingly common making independent travelling for women a big challenge.
- This project uses past crime cases to predict the possiblity of crime in a location in future and thus give an alert to the user planning to go through an unsafe path.

# Previous research/projects on similar concept.

- Taking in view, just the technical aspects of the solutions proposed so far, we have
  - Various Mobile Apps like VithU(an Initiative by Channel V) etc. that track your location and update about it to your friends/relatives/pre-subscribed contacts or near by police stations.
  - A large number of inconspicuous wearable devices in forms of Wrist Bands, Hair Clips, different forms of jewelry like ring, necklace etc. that can be used in conjunction with your smartphone to send alert messages if required to trusted people. Examples: SafetyLink, Bembu(Bluetooth Emergency Button), Guardian Angel, Cuff,
  - APSS(Amrita Personal Security System) is one such initiative taken in India itself.
  - Suraksha is another security system to intimidate instant location and a distress message to the cops and registered number, so that unfortunate incidents can be averted.
  - Safe City is a web app which uses user feedback to mark locations.

# What is our Idea?

- It is a two fold approach:
  - Use the media efficiently.
  - Learn from others' experiences.
- What do I mean?
  - We as Humans have an inherent sense to detect or sense danger or unsafe locations.
  - We might have encountered such situations/locations, but would have been lucky enough to be saved.
  - Now, we want to alert our near and dear ones about the same.
    - Location where we sensed danger
    - Reason for feeling the same
    - Rate the place on scale of 5 depending on the level of danger sensed. (5 being highly unsecure)
    - Short description of the incident (if we so wish)
    - Timings of the incident.
  - This would in turn help them to be more cautious while taking those routes or avoid the routes if possible.
  - Secondly, media publishes various crime reports to make us aware of our surroundings. Taking into account their research and articles can really come in handy.

# What exactly are we doing?

This application aims to suggest the safest path between two places and forewarn against approach towards an unsafe route. This model works on two fold approach. Primarily, it is based upon group aware feedback based on location tagging. Further, it will be supplemented by extracting information about the unsafe locations by analysing news feed in a particular locality.

# Implementation methodology

## 1) Crime news analysis

Newspaper articles often contain several references to names of places. If these references can be mapped and displayed on a map, a spatial perspective into the data is created. This perspective allows the user to better appreciate the scope and concentration of the references; the user is able to clearly see where the references are, the distance between each, and also visualize concentration or clusters of the references. Using NLP technologies, algorithms can examine the sentences containing these locations to extract themes of interest and begin to track trends.

- Online news articles have been scrapped to extract crime related articles for any place (here Delhi).

- Elimination of articles belonging to the same news:
  - 1)TF-IDF Document vectorization
  - 2)Calculation of cosine similarity

Geotagging has been used identifying the geographic location of the given article. The process can be classified into two categories:

1) Toponym recognition: All toponyms are identified and saved as a gazetteer. This step involves the knowledge of natural language. The gazetteer has been populated with 1740 Delhi locations

2) Toponym resolution: All the identified toponyms are assigned to correct geographic location. In other words, a data set has been created with the names and corressponding longitudes and latitudes of the toponyms.
To identify the locations in an articles we have used NER and POS tagging.

The identified locations are then marked on the map using marker clusterring techniques

# 2) Group aware system(still in process)

The second half of the project is a mobile/web app through which any user can provide a personalized feedback of any location to others.

Through this system:
a) The user can login using his/her phone number.
b) Pin any location on the map.
c) Give the title, short description, long description anf crime rating as per his/her experience.
d) Read about other people's experiences.

# Login Module

- We have used the phone number of the person as the Username of the person.
  - Assuming each SIM card is issued on a valid ID Proof.
- The password is a 6 digit one time usable PIN send using the SMS Gateway Provider “Twilio” (Trial Version). ( a copy of this one time PIN is send at the server as well)
- The PIN is then verified at the back-end and access is granted.
- Idea 1: User will be able to login only if he has a valid working phone number, for PIN to be received.
- Idea 2: The verification could have been at the application side, but then crack would have been easy. (so server side authentication)

# How is the trust established on the rating of Location?

- I am assuming an inherent trust model.
- Assumption:
  - You will add only those members in the group whom you trust.
  - You will want your group members to be safe.
  - Accept a request from the group, only if you trust someone from the group.
  - Only a group member whose contact is stored in your contact list, can send you a group join request, not otherwise.

# What if someone tries to defame the place?

- This is not a possibility here.
- Say x number of people want to defame the place, thus rate the location as unsafe(5 stars).
- **Argument 1**: Only one Rating will be saved in the database corresponding to one user. (it can be altered but not multiplied)
- **Argument 2**: Even if those x persons rate a particular place as severely unsafe, this information will be exposed only to those, who trust these x people.
- **Argument 3**: The average rating is stored for each location.

# Sync with the server –When?

- In this case, I have proposed event driven sync with the server.
- **Event 1**: When the application starts and the phone is connected to the Internet.
- **Event 2**: When user himself wants a deliberate sync to update the tagged location and their average rating if any.

- Advantage:
  - Low Data Usage.

# What is the USP of this idea?

- You can use the maps and see the tagged locations or even tag a location, even when not connected to the Internet.
- The latitude and longitude of the location can then be fed to another module, which gives your direction while travelling.
- It can then alert you if you are in 100 meters radius of the unsafe location.( assuming GPS accuracy 15 meters on average)
- The app can also be configured to show an alternate route avoiding the location, if so required.

# What we have till now.

- News articles have been scraped and locations extracted and marked.
- A basic registration login page has been prepared.
- A basic homepage on which a form and a map is visible.
- The user can use the form to tag a location and give description
- The map shows the dander flags using marker clusterring clearly indictating how safe or unsafe a location is.
- Server side of the complete group aware system is ready.

# What is left to do.

- Client side for the group aware system needs to be completed.(approx 4-5 days)
- GPS needs to be integrated. (approx 3-4 days)

# THANK YOU