

Section D : Design

Select one of the two problems below:

- (i) Analytics and alerts on women safety using mobile microphones and public area cameras
- (ii) Analytics and alerts on air pollution in Delhi using vision and IoT sensors

Discuss in about 500-600 words how you would design a solution for the problem you selected above. Your solution approach needs to consider the following parts:

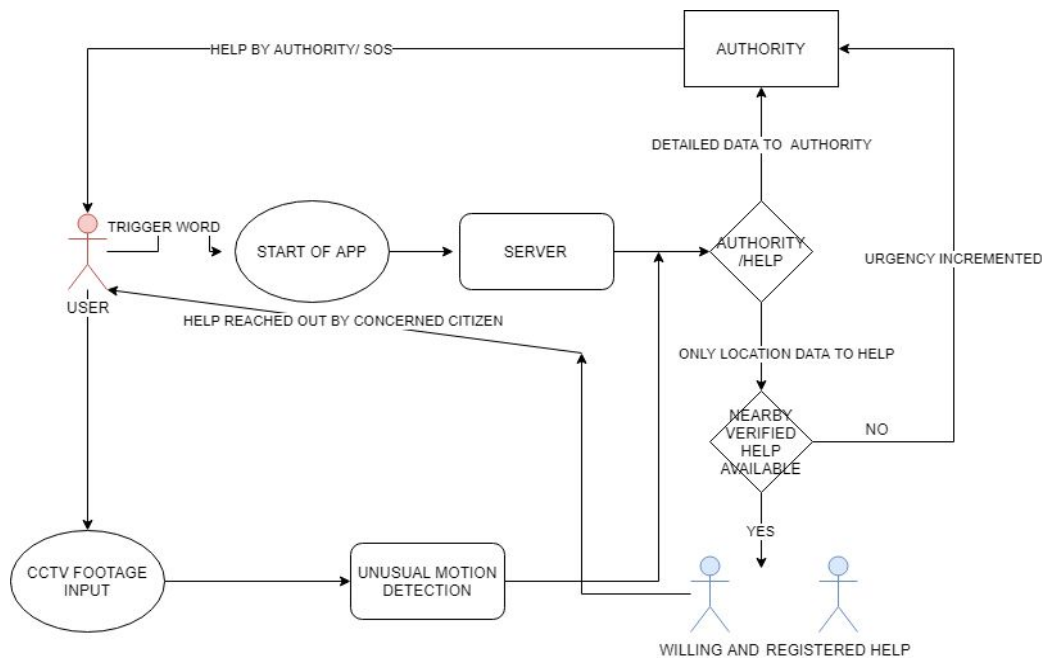
- a) Datasets or data acquisition for training
- b) Choice of machine learning algorithm to run online or offline
- c) What platform can be used to run machine learning algorithm (for e.g. Raspberry Pi, smartphone, cloud)
- d) Sending alerts over the network via peer-to-peer methods or cloud architecture.

This question is open-ended so you need to outline the design choices you will make. Include an architecture diagram and how you would measure the performance of the system you design. What demo can you show and what key challenges do you expect. (Note: Additional credits on out of the box feasible and interesting ideas)

Solution : (i) Analytics and alerts on women safety using mobile microphones and public area Cameras.

Real Time Women Safety Mobile App and Integrated Assault detection system

Bringing Help using AI : BHAi App



- **Introduction**

In this project , we will be aiming for an intelligent and automated system for Women safety and assault prevention. The system will be primarily divided into two subsystems as:

- 1) Violence/ Assault detection using CCTVs
- 2) Women Safety App utilising public participation.

The combined system can help avoiding/alerting about a prospective female assault while The android application will allow quick alerts, response and action in case of a woman's Encounter.

1) Violence/ Assault detection using CCTVs

In this project, we will use artificial intelligence in association with computer vision and object detection algorithms to detect unusual motion.

We will convolute AI with public area cameras where unusual behaviour will be defined, so that the computer application can automatically detect any sort of troubling activity and can alert the authorities.

The use of appearance encoding algorithms to precisely detect people on CCTV footage. This will not only help in preventing the mishaps but also be extremely useful in providing strong proofs in judicial systems for fast tracking any court case and getting the victim justice.

As soon as the CCTV detects a **suspicious** behaviour, the server will be updated with the location of the detecting CCTV. Not only this but the app users nearby will be fed with the geographical location of the detecting CCTV.

Datasets acquisition for training:

1. Human Foot Keypoint Dataset
2. VIRAT Video Dataset
3. Fast Fight Detection Dataset
4. Aerial Violent Individual (AVI) Dataset
5. **Dataset defining suspicious behaviour can be made using multiple tools available**

Choice of machine learning algorithm:

1. ScatterNet Hybrid Deep Network:
extracts invariant and discriminative image representations for object recognition
2. PCANet and Convolutional Neural Network:
deep learning network for image classification
3. Feature Pyramid Network (FPN) :
generic feature extractor
4. SpatialNet

Platforms to run Machine Learning Algorithm

1. Raspberry Pi
2. Cloud Server

Sending alerts over the network via:

Video Transmission Cable (RG59) to the CCTV video server.

2) Women Safety App utilising public participation.

We intend to create a mobile application (Android) to enhance women safety using public participation. The one basic drawback of any women safety app is that the app cannot provide immediate assistance to the user/victim.

The app we intend to develop would work on the idea that 'public witnesses before police'. The user can use the app either manually when the user expects an attack or it will automatically get triggered when the app detects a 'keyword'. On the footsteps of 'Keyword spotting' used by Google

and Apple , we plan to include a keyword activation in app when the **Safe Word** is mentioned by the user.

Function procedure of the app:

1. A user is supposed to register where app will connect with phone's geolocation using geolocation APIs, with inclusion of extra information about user which can help authorities in future if required.
2. Using keyword spotting algorithm the SOS app will be triggered. The keyword/Safeword will be defined by the user.
3. In case of activation of app the data of user including the real time location will be transferred to server of application database.
4. Further the system will check for registered and verified concerned citizens, as well as authorities like police help nearby the location using shortest path algorithms and Google Map API etc.
5. The details of the neighbours signing up to help the user/victim will be provided to the authorities to help live track for added security.

Technology Stack:

- 1) Android Studio
- 2) Google Maps API
- 3) Volley - Android
- 4) GPSTracker.java
- 5) RGeoCoder.java
- 6) MapsActivity.java

