

INTELLIGENT SYSTEM FOR SITUATION FINDER

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Abstract— In the 21st century, the science and technology was developed. Kidnaping case is one of the major crimes happening in the world. However, currently in Sri Lanka also its getting increased because of political issues, personal problem and also for money. So, it is very hard to hear up about women and child abuse in Sri Lanka. From these issues not only, an individual person's life affected but also our country is getting downward in the marketing world. We don't have the rights to blame our government for this problem. There for we proposing a system to find out the situation of person through a gathered data from the place and intelligent manner. Even though there are several systems for capturing the location, sound and images. But in past researches there are limitations in those applications. The major limitation is that the past researches are not aimed with Sri Lankan users. Our intelligent manner system will find out the person heart beat and location if these things get differ system will start to capture the image and audio through the smart watch. These raw data are analyzed by image processing, natural language processing and extracted. Then, extracted data go through the machine algorithms for predicting situation of the person. Machine is trained with the sample dataset to perform well. Using our system, we will send alert to related people and organization because of this we can safe people from kidnap because system will run in real time and action also get start at the same time of kidnapping.

Keywords—Machine Learning, Natural Language Processing, Datasets, Location, Image Processing

I. INTRODUCTION

In our country, each second lots of crimes happening. So, to minimize those problems we are introducing the proposal background of Intelligent System for Situation finder in this section, in order to make readers have a better understanding of Intelligent System for Situation finder' research progress and application fields.

There are 20,931,51 [10] (March, 31, 2018, based on the latest United Nations estimates) population in the Sri Lanka. There are 14,884,042 [9] adults in Sri Lanka, our system is to provide the maximum security to people. Our system is to secure the people who are in risky situation by kidnapping and Abduction. According to the census there are 414 [8] kidnapping and Abduction happen until 2016 in Sri Lanka. Therefor from this research we are going to secures the life's of people. This application is the best method to find out the kidnappers by using heartbeats, noises, videos and by captured images from these evidences the police can be able to know the kidnapper easily. When comparing with other countries the personal security for a individual person is very less. So by

inventing this new technology we are going to minimize the kidnapping cases and secure the human being.

II. RELATED WORK

We made background study related the system for alerting kidnap but there not such same system available but we found research on image processing, voice recognition, machine learning and geo location. We study each separately and combined them together to develop a system to find a kidnapping at a real time.

Global Navigation Satellite System (GNSS) was developed united states. The Global positioning system (GPS) is a part of that process of GNSS. GPS identify the current location, time and velocity of microwave signals which is transmitted from the earth orbit satellite. By using multiple satellite, the GPS receiver is calculating the location instantly [6][7].

There are three divisions in GPS.

- 1.Satellite constellation
- 2.Ground control network
- 3.User equipment

Satellite constellation - Implementing the ranging signals

Ground control network - Monitoring the orbit earth satellite

User equipment - user segment to gather information

By using GPS we can clear construct a tracing information path.

Criminal Pattern Identification Based on Modified K-Means Clustering

These researchers using data mining for identifying criminal patters how they occur and any also predicting relation between other crime. They using modified K-mean algorithm to do this work. The Modified k-mean algorithm reduces the complex nature of the numerical computation, thereby retaining the effectiveness of applying the k-mean algorithm[1].

First, they extracting data from the sours after that they visualizing the data into graphical models using some algorithm to easily make decision. They mainly doing this for

identifying crime occurring in the public parks. The experiments show that the modified K-means algorithm leads to a better way of observing the data to identify groups and their similarities and dissimilarities in the criminal dataset as a specific domain.

A Wireless Early Prediction System of Cardiac Arrest through IoT

Using IoT things we can do lot of favors thing to world. One method is using smart phone to identifying health care of the persons. One of the most prevalent healthcare problems today is the poor survival rate of out-of-hospital sudden cardiac arrests. They address this problem by using Bluetooth sensors connect with mobile phone to identify the ECG level of the Person [3].

However, these existing heart attack detection systems can detect a risk the heart attack happened and also the system sends an alarm to the caregivers. The ideal way to reduce the number of risks is to alert the users about their abnormal heart rate and bring to their attention that they are at a risk of a potential heart attack. If abnormal ECG patterns can be accurately identified using automated processes, the elderly may be able to avoid injury from a potential heart risk. Like this way person situation can be first alert through the sudden change of heartrate and system can start to work.

Real- Time Speech Emotion Recognition by Minimum Number of Features

There are wide ranges of features in the voice. Feature selection is directly related to the process in which we tend to do it. Selecting inappropriate features lead to both low performance and overload processing. Overload processing in the real time applications such as robotic has no justification. Feature selection is a challenging step of the recognition processes. All features of voice play role in the speech style. The values of these features are varied from one person to another. On the other side, the accuracy of classification algorithm is influenced by distinguishing factors. Changing the value of features has different impact on the emotional states. Although considering all features of voice and using dimension reduction algorithms is useful option for increasing the accuracy; however, the computational volume should be reasonable for real-time processing. Mentioned option is useful for the off-line application. Additional processing load is the last option for real-time applications. The optimal solution is selecting features in which simultaneously produce both high performance and also do not require to the large amounts of computation[4].

In this research they considered only some features of voice and this system will find all emotions from the voice. Similar other researches get energy, duration and pitch from the voice data to analysis the emotions but accuracy is not 100 percentage sure and not real-time. In our research only we need loudness of the voice and pitch of the voice data. Real- Time

Speech Emotion Recognition by Minimum Number of Features have some algorithm to find the loudness and pitch.

Loudness is defined as the number of samples m in the frame. See (2)

$$E = \sum_{n=0}^{N-1} |x(n)| \quad (2)$$

Tn which x(n) is n-th sample in the frame and N-J is the volume of frame. The loudness is calculates according to(3) in decibel.

$$E = 10 * \log \frac{1}{N} \sum_{n=0}^{N-1} |x(n)|^2 \quad (3)$$

Image Segmentation for Determinations of Object Descriptions

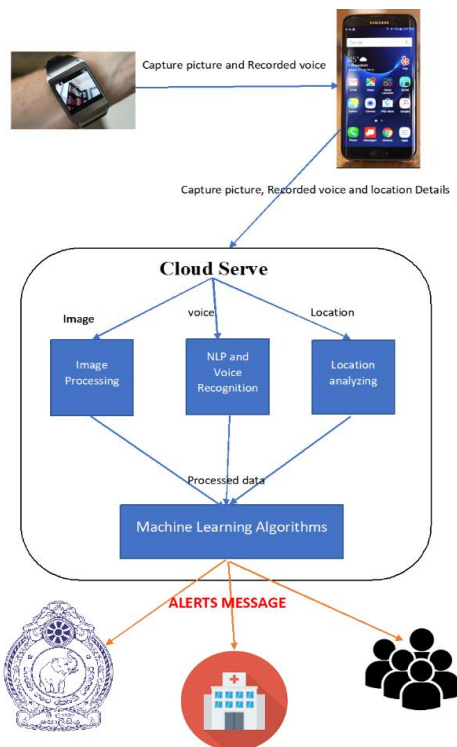
Some random researcher explains in his paper how to get the objects from the image [5] Low-level image processing, deals with detection of features. To extract the features from image, it is recommended to use feature detection. Feature detection is the initial step in image processing.

The researcher continuously says that A number of feature detectors are developed. These detectors are based on computational complexity and repeatability [5]. Some of the important detectors are edge, corner/interest point, Blobs/regions of interest, ridges etc.

The processing continues to detect the no of persons and the weapons they have in their hands in order to do that we have to use edge diction.

Obtained edge operators need some additional improvements for image segmentation. The edge recreation techniques are attempted to two problems: one is to remove false edges and the other is to complete edges which have lost information due to the noise or a weak gradient. One of the main goals in the image processing is to remove the redundant information [13].

III. ARCHITECTURE OF THE SYSTEM



IV. METHODOLOGY

Information Gathering: In this phase the Requirement Gathering was done by searching in research papers and other materials.

Approach: In order to develop the proposed system, it was very important to identify the best software development methodology. The team followed the waterfall model to implement the software which consists of the following steps

- ☐ Requirement Gathering and analysis
- ☐ System Design
- ☐ Implementation
- ☐ Integration and Testing
- ☐ Deployment of system
- ☐ Maintenance.

Design: After gathering the requirements that were needed for the research, we had to understand the requirements properly. Before starting the coding phase, it was important to know how the end product looked like. In the Design phase we prepared the architectural design, interface design and the database design as well. The requirements gathered in the requirement gathering phase were studied and understood in the design phase. The architectural design was done according to the system requirements. In this, we should provide a basic idea of the relationships among the modules. Apart from the system design and architectural design, the database and interface designs were also be prepared.

Implementation: After the design phase, once the general design was done, then came the implementation phase where it

is worked out. In the implementation phase, the implementation of the approved user requirements was taken into account and implemented.

In this section we gathered information and ideas to develop a method by reading past researches and other related articles. Information is collected under mainly two heading to easily illustrates the ideas. Those are

The Emerging Ethics of Human Centric GPS Tracking and Monitoring

GPS has the ability to calculate the position, time, and velocity of any GPS receiver. The device we used here use standard GPS and it used to communicate with satellite by using same hardware. So, by using triangulation method we gather the information by using GPS.

Mobile Tracking Application

The application will gather the information within a short time period and sending out it to the mobile device by tracking method the transmission will done. Here the information is collected by tracking where current location and from where the safety geo fence by GPS. Bluetooth terminals can exchange information with each other and then a Bluetooth access point provides the interface to a mobile network. In their solution they presumed that Bluetooth fixed infrastructures are expected to be installed in offices, homes and public areas which is not the case nowadays.

Approach -

The below steps are used to calculate the distance and its by trigonometry.

1 minute of arc is 1 nautical mile

1 nautical mile is 1.852 km.

$$D = 1.852 * 60 * \text{ARCOS}(\text{SIN}(L1) * \text{SIN}(L2) + \text{COS}(L1) * \text{COS}(L2) * \text{COS}(DG))$$

Where,

L1- latitude at the first point (degrees)

L2- latitude at the second point (degrees)

G1- longitude at the first point (degrees)

G2- longitude at the second point (degrees)

DG- longitude of the second point minus longitude of the first point (degrees) = G2-G1

D- Computed distance (km)

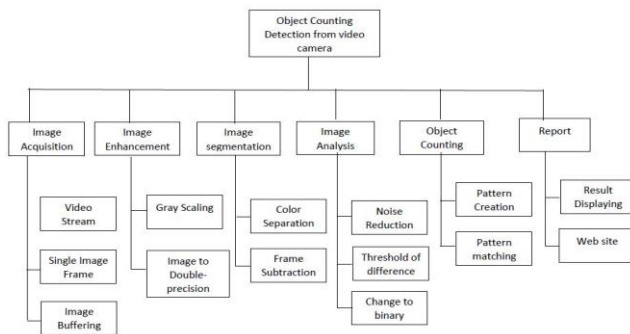
s

In this case this algorithm used to find short distance.

Object finding and counting with Image processing

The research intends to develop the object detection and counting system using image processing. Overall works are

software development of a system that requires a video stream or single image. The object detection and counting system consists of six major components: 1) Image Acquisition 2) Image Enhancement 3) Image Segmentation 4) Image Analysis 5) Object Counting, and 6) Reports.



The idea of using the Images to count the number of objects has been proposed as a new way of detection and counting approach. The current detection and counting approaches are based too much on the sensor equipment. The use of sensor equipment to count the number of objects has been widely spread into different kinds of industries. Even we can find the number of objects in the image using a sensor provides a benefit to the user, there are also some disadvantages. The sensor

Equipment is only used for real time - the user cannot insert other kinds of input such as video file to the sensor equipment in order to count the number of objects.

1 Image Acquisition

We get the input from a smart watch camera which is video stream. It is very difficult to perform the detection and counting process from the streaming level because all required abstractions are in the single frame level. So, we gather the image in frame level.

2 Image Enhancement

We have to set the level of difference between two images, the background and the image with moving objects. The level must be settled appropriately because it is used to decide whether the value in each pixel between two images is different enough or not. If the values of difference are greater than the level of difference, we assume that there are some objects in the scene. The level of difference is very important. Sometimes the values in the same pixel between two images are slightly different because of light energy, not the moving objects.

3 Image Segmentation

We have to calculate the approximate size of the objects that we have to detect using the height of the video camera and the size of objects that we have gathered before.

4 Image Analysis

This is the operation in charge of finding the number of objects that are moving in the detection area. By using a pattern matching technique, we will get the number of objects in the frame.

5 Object Counting

This process is to count the number of objects in a scene. The number of objects that are detected will be collected in the json file to be analyzed.

6 Reporting

The number of objects will be reported to the machine learning in a proper way its json file.

Finding emotion using voice recognition

For studying the basic nature of features in speech under different emotional situations, we used data from additional data set. As part of the data collection, we recorded the voice from smart watch. After the record, android system will send the data to server. Server will get the data from mobile phone then voice recognition service will active current time. For extracting features from the recorded speech segments, Python SciPy signal library were used.

First read the audio file and get sampling frequency and sound object, then Find the data type of sound file. Ex: int 16 or int 32. After that find the audio channel is dual channel(stereo) or mono channel. In this voice recognition part, we are using dual channel audio. Sound object have amplitude details of the voice, so we will use that details to find amplitude of particular voice and save as csv file. Then using fast frequency transformation algorithm find frequency of the voice. Then using log algorithm find the power of the voice and print as csv file. So many amplitude and power of the voice are generating each second so we will find mean of the amplitude and power to analysis the emotion.

Get the emotion data set from the University of Toronto and using those algorithms to find amplitude and power of the voice. Use 15 male and female data sets for those steps. Categorize the emotion by happy, sad, fear, angry and neutral. For prediction of the emotion support vector machine algorithm is used.

Decision making with machine learning

Data gathered from the other modules such as image processing, Voice recognition and Location based data are sent to machine learning module as a json objects. The machine learning module consist of the trained model. Which have trained using Random forest and Logistic regression algorithm. Dataset for the training purpose was created using the police case details database and also from the information gathered from media.

Dataset consist of

1. Number of kidnapers
2. Number of weapons used
3. Basic details of the person

4. Social status of person
5. Distance between the kidnap
6. Place of kidnap

Dataset also visualized in different form of diagrams to get a clear idea of the data. When the data is received from other module system will sent the data to machine learning model and the model will predict the situation is risky or not. Random forest and Logistic regression algorithm are combined together to increase the accuracy of the prediction.

If the system predicted that the situation is risky the system will alert the police with the location and other related information at the same time people in the person contact list also alert through the SMS notification. Otherwise system will add all the information to database for future purpose.

V. CONCLUSIONS & FUTURE DIAMESIONS

The purpose of the proposed system is to find a kidnap in intelligent manner. This system will use environmental factors such as image, voice, location and heartbeat to find the situation of the person, alert the nearest police station. Mostly this system will be useful for women's who are travelling alone and people who have risk in the society. System will automatically start and provide help by alert the related people.

In future, smart watch can be available with advance technology and features therefor system also develop using these features to find the situation. GPS technology available on the smartwatch having error rate between 30m to 90m so using advance technology this error rate can be reduce and continuous tracking of the person improve.

In voice recognition area we hope to add more language modules to system and we can attract more no of users towards the system. By adding neural network into machine learning area, we can identify the kidnapping patterns. In future using advance development technology system accuracy and efficiency can be increase.

ACKNOWLEDGMENT

First, we would like to thank Sri Lanka Institute of Information Technology, for providing the opportunity and platform to develop and expose our skills and abilities via performing a research project and for all collective arrangements done to make this module successful. This project would not have been possible without the guidance of our research supervisor Mr. Samantha Rajapaksa. We would like to sincerely thank him for the valuable insights and supported us to make this a success. His guidance and concern provided throughout the research of our project is thoroughly appreciated. Our collective thinking, effort and collaboration is what made our project a success.

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