INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume 5, Issue 2)
Available online at: www.ijariit.com

Geofencing for disaster information system

Diksha Kewat
kewat.diksha76@gmail.com
New Horizon Institute of Technology and Management, Thane, Maharashtra

Kiran Baxani
baxanikiran1311@gmail.com
New Horizon Institute of Technology and Management, Thane, Maharashtra

Vaishnavi Tonpe
vaishnavi0033@gmail.com
New Horizon Institute of Technology and Management, Thane, Maharashtra

Dr. Sanjay Sharma
mailsanjaynsharma@gmail.com
New Horizon Institute of Technology and Management, Thane, Maharashtra

ABSTRACT

Due to the lack of effective and coordinated disaster management system which consists of the stages like disaster mitigation, preparedness, response, and recovery has led to both the increase in the loss of both life and property. The paper proposes an effective disaster information system which uses the geofencing technique so as to detect the movement of users. This technique creates a geofence around the user and thus monitors the user's entry and exit from the fence. This model uses a K-Nearest Neighbour (KNN) algorithm along with real-time data collected from smartphones. For crowd disaster mitigation and real-time alert to avoid an occurrence of a stampede, this android application is an easily deployable context-awareness mobile Android Application Package. The application provides high accuracy when the user is in the fence.

Keywords— *Geofencing, KNN, Disaster management, Google API*

1. INTRODUCTION

Natural and Man-made disasters are proven to be devastating for both human life and property. The major cause is that neither the people were aware of it nor any effective measures were taken by them. Thus, there arises a need for proper mitigation and preparedness measures. And because of this need, a functional disaster information system is developed which will let people have prior knowledge in the times of disaster. This model aims at delivering risk information to the users directly in order to reduce the damage. In this system, geofencing is used to detect the movement of users and directly deliver the risk information to them. Using the geofencing technology on the user's Android mobile phone, the area around the user is dynamically defined as a geographic area of interest. The system is proposed to be of a client-server architecture where the server collects disaster information from various information sources and the client watches the user notify the information as the need arises. Thus, the system can deliver warnings and advice timely to specific users in danger directly to the users.

2. OBJECTIVE

To detect the user's movement, the user creates a virtual fence called geofence at the dangerous area based on the risk information stored in the server and monitors the user's entry and exit of the fence. Android devices can be a medium of most effective and convenient communication can be useful to deliver timely and reliable information.

The main objectives of this disaster information system are to execute the geofencing technology on the Android device; it also provides reliable and comprehensive support for the people that are in need; therefore to help various organizations leading to disaster and reduce risk management. This proposed study executes through mobile phones operated on the Android devices of users. Any user who has connectivity to the internet via WIFI can benefit from this system.

3. PROPOSED METHODOLOGY

3.1 What is geofencing?

Geofencing is a mechanism that makes a virtual fence in a specific area. The application sets a geofence at a dangerous area and gives disaster information to the user. Geofencing combines awareness of the user's current location with awareness of the user's to locations that may be the area of interest. In order to define a fence, the coordinate (latitude and longitude) of the place are required. A circular area is defined by the coordinate and radius. A geofence is set to the circular area [1]. You can limit the duration of any geofence by specifying an expiration duration in milliseconds. After the geofence expires, Location Services automatically removes it.

Fig. 1: Geofencing action

3.2 System architecture

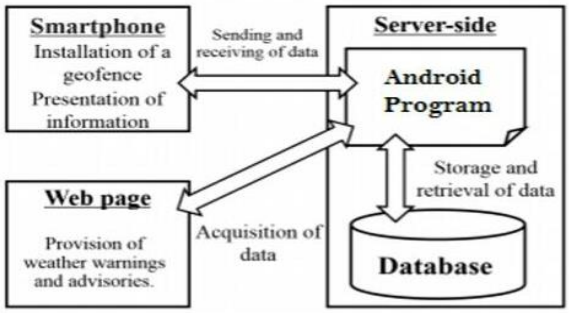

Fig. 2: System architecture

3.2.1 Smartphone: Geofencing will integrate the awareness of the user's current location with awareness of the user's proximity to locations that may be of interest. To mark a location of interest, its latitude and longitude need to be specified. To adjust the proximity for the location, a radius is added. Thus, the latitude, longitude, and radius define a geofence, creating a circular area, or fence, around the location of interest. [2]

3.2.2 Webpage: It consists of a dynamic virtual notification on the user's Android OS. This application is rooted in the geographical location of a mobile user concerning a changing data stream. The mobile user gets notified that what the risk is nearby.

3.2.3 Android Program: The Android program is developed using Android Studio. The user's location is accessed using Google API to use the Maps JavaScript API, an API key is required which is then added to the mobile app. This key, when integrated with the app, generates an Auth Token that identifies the specific user. The APIs provide access to user data (when permission to read the data is given). The tools required were:

- Android SDK
- Android Studio
- Java SDK
- Notepad++

3.2.4 Database: A Geofence table is created in the database on the server side. The system maintains separate tables:

Geofence, user's table and user's location table. PostgreSQL is used to manage the database system. Data is received to PostgreSQL and sent from android using Post Hyper Script (PHP) and Structured Query Language (SQL) [3]

4. PROCESS FLOW

This system consists of three main roles:

- Admin (Server side)
- User (Smart phone)
- Application

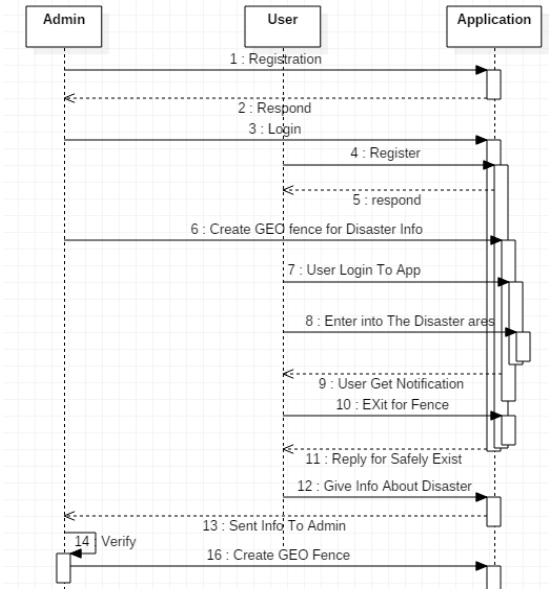

Fig. 3: Sequence diagram

4. ALGORITHM

KNN is a nonparametric lazy learning algorithm. The KNN algorithm is a method for classifying objects based on the closest or most similar training samples in the feature space. It is a form of instance-based learning. An object is classified by a majority vote of its neighbours. This nearest neighbour is determined by the use of distance functions. Eventually, the unknown object is assigned to the class most similar amongst its k nearest neighbors.

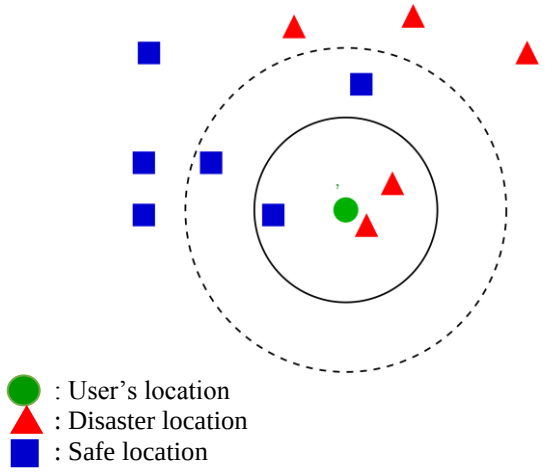

Fig. 4: KNN classification

The test sample (green circle) should be classified either to the first class of blue squares or to the second class of red triangles. If k = 3, it is classified to the second class, because there are 2 triangles and only 1 square inside the inner circle. If k = 5, it is classified to the first class (3 squares vs. 2 triangles inside the outer circle). [3]

5. FEASIBILITY

5.1 Technical feasibility

The deployed system has modest technical requirements. It requires Wi-Fi to function in order to detect the user's location. And it requires Google API for location services.

5.2 Economic feasibility

The project will be designed for the Android OS. Android being an open source platform will reduce the cost of the system proposed. We will be implementing the Geofence using Google Maps, hence no further expense would be necessary.

Thus, the developed system will be within the budget and this was achieved because most of the technologies used are freely available. [2]

6. APPLICATION SCREENSHOTS

Fig. 5: Admin/User interface

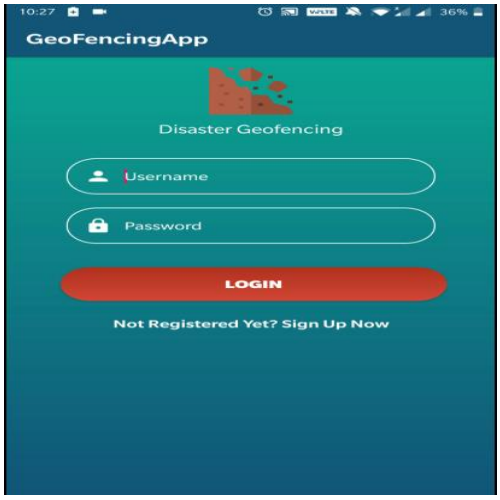

Fig. 6: User login page

Fig. 7: Disaster location page

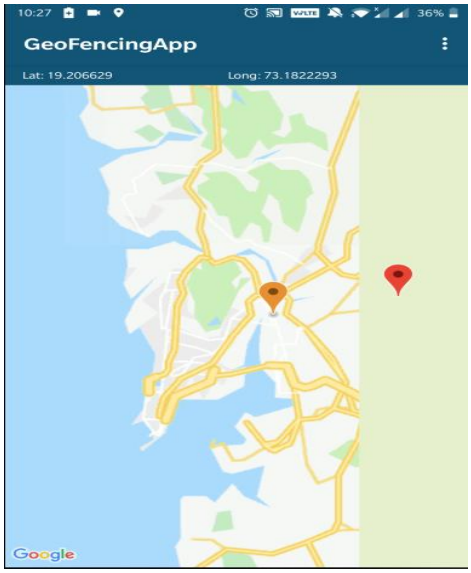

Fig. 8: Disaster Detection page

User location

Disaster location

7. CONCLUSION

Realizing the need for an effective application for disaster information management. This application can be a useful medium of mitigation, preparedness and response in a disaster scenario. This system presents the disaster information based on a person's movement was proposed. We implemented an experimental system by using geofencing and evaluated the system in an urban area. Further study is necessary to evaluate the system in case of larger fence sizes. [4] Improvement of the location accuracy is also very important to deliver risk information timely to users. This disaster information system helps the people while entering in the disaster area and makes them aware of using their Android Smartphone and with the help of geofencing for their information.

8. REFERENCES

[1] Akira Suyama Graduate School of Engineering Tokyo Denki University Tokyo, Japan 16kmc16@ms.dendai.ac.jp 978-1-5090-0806-3/16/$31.00 copyright 2016 IEEE ICIS 2016, June 26-29, 2016, Okayama, Japan

[2] International Journal of Research In Science & Engineering 8299 Special Issue, Volume 4 Issue 2, March 2018 e-ISSN: 2394- p-ISSN: 2394-8280

[3] https://pdfs.semanticscholar.org/4a30/934c3bdf595ddfed32271dbba070f73571b1.pdf

[4] https://www.fig.net/resources/proceedings/2015/2015_11_nepal/T.S.3.8.pdf Nov 27, 2015 - Dipesh Suwal, Suresh Manandhar, Ganesh Dha al, Shashish Maharjan

[5] Fujitsu, "Geofencing in iOS with Objective- C," http://www.fujitsu.com/jp/services/application services/informationmanagement/web-integration/column/column019.html

