Snake Alert Application: A Snake Tracking & Reporting System

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ABSTRACT

In 2008, an estimated 90,000 lives were lost to snake bites, with India being the most devastated [1]. Governments and health agencies spend time and money trying to curb this, but frequently fail because of the dynamic nature of snake threats. Snake Alert is a public health communication application, aiming to provide users assistance in reporting and being notified of snake sightings. First, prevention of snake encounters, by crowd pooling information on snake sightings based on geographical location. Next, the application allows users to upload photos of snakes upon each sighting, and with image recognition, and identifies the respective snake species. Lastly, the application provides onsite instructional self-treatment with specific advice based snake type. This application can be used to save lives, and provide accurate & dynamic information to people living in remote parts of the world.

Author Keywords

Public Health; Monitoring; User Submission; Image Recognition; Mobile-based System; Web Application

INTRODUCTION

Snake bites are a health issue in many countries and regions, especially the tropical and subtropical ones. Each year, there are an estimated 5 million snakebite cases occurring across the globe [2], leading to 2.5 million envenomings (poisoning from snake bites), which lead to 100,000 deaths [3, 4] and around three times as many permanent disabilities [2]. The vast majority of snakebite cases occur in Asia, Africa and Latin America [3], especially in countries where health systems and procedures lack in linearity and resources, resulting in slow responses and treatments.

The developed system described below (Snake Alert) looks at the tracking of different species of snakes, as at present, there are no mobile applications that allow for the tracking of snakes. A search of available applications pertaining to snakes show applications that track a pet snake's personal development (i.e. weight, food intake, etc.). It is hoped by the research team that the application will aid users and healthcare workers in lowering incidence and prevalence rates of snake related morbidities and mortalities.

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SYSTEM OVERVIEW

The Snake Alert system contains 3 major components: database, a web application and an Android mobile Application. Figure 1 demonstrated the overall system architecture of all 3 components and their interaction. system, including information on the various snakes and snake types, as well as incidents or sightings. The web application and the Android application access the database to modify or retrieve data appropriately.

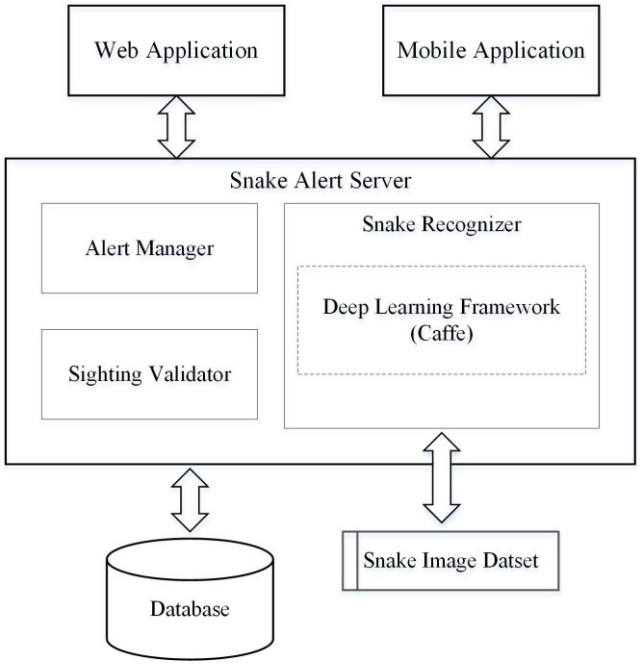

Figure 1. Image capturing process

EVALUATION & TESTING

Testing the Snake Alert application proves difficult in a clinical setting. The best way to test the Snake Alert application is by rolling out and encouraging users to provide feedback as and when they encounter difficulties, either taking pictures of snakes or clocking incidents. Improvements can be made to the application at the point of concern, and changes can be made remotely.

Nonetheless, a preliminary testing of the image recognition software has been completed by the authors, whereby images of snakes and other non-snake images were uploaded to the system,

to yield the accuracy of the application in differentiating snake versus non-snake images, and accuracy of snake type matching based on the database of snakes for comparison. The evaluation technique was run in-house, prior to launch and tweaks were made to ensure accuracy in both measures. Testing the Caffe system, results of the training are shown in Figure 6. In the former, the system correctly identified that the image uploaded was a snake and correctly matched the snake type based on the image. In the latter, the system was able to identify that the user submitted photo was not a snake and correctly informed users of such. Data sets for testing were taken from Google images as well and with the total of 100 images, the rate of classifying correct snake types was 89%.

DISCUSSION

The application has potential use in countries where snake-related injuries are common, like India and Myanmar. These countries also notably have a higher surface of rural regions, and are tropical and subtropical in nature thus experiencing heavy rainfall and a humid climate. These conditions prove to be a hotbed for snake reproduction and to be the living ecosystem of a number of species. In the literature review, we discussed the possibility of employing mobile technology to lower both incidence and prevalence rates of snake-related injuries in countries that have increased & increasing mobile penetration rates. Using the above criteria, it would be easy to target specific nations in which the application can be launched.

There are several useful lessons learnt by Lwin et al., whose research team launched pandemic dengue surveillance in Colombo, Sri Lanka, which can be adopted by the team [5]. Firstly, to increase sustainability, it is important to collaborate with members of government bodies. This will allow the proliferation of the application to be far more seamless. The researchers also found it quite useful to collaborate with companies who are willing to ensure that the application is utilized by their own staff members. This will allow for more effective testing of the application as well.

CONCLUSION & FUTURE DIRECTION

In this project, the author designed and developed a Snake Alert system. This system will help users to be aware of snake bites with the help of Android phone alert system. The Snake Alert system includes both a server side and client side (Android application and Website). With the successful development of the Snake Alert application, it is hoped that there will be a reduction in snake bite incidents. The reduction of snake bites, especially in rural areas, will reduce the rates of death or permanent disability resulting from snake bites. Additionally, it is hoped that if authorities take up the application and use it for tracking of snake movements, it will be beneficial for snake population control too. If authorities are better able to track sightings and incidents, they will be able to both eradicate the threat of snakes in certain areas by increasing their control of snake population, and be able to provide better warning systems to tourists and residents in areas of high sighting. The authorities may choose to rehome snakes found in hot spots, and improve livelihood for both snakes and people sharing the environment.

The application is not without its' limitations, and at present is only available for Android users. Future work will look into developing iOS versions, to break into the large Apple market. Another feature that may be developed in future is the connection between snake incidents and emergency services. This would allow users who have been bitten by a snake to create an incident on the application, receive first aid advice on the application, and call for help. Ambulance services and virtual first aid can be provided to users clocking an incident in this manner. Additionally, a notification can also be provided to application users' emergency contact.

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