GPS Based Dengue Risk Index Calculator

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ABSTRACT

Dengue is a mosquito-borne tropical disease caused by the dengue virus it is an extensively scattering disease spread by several species of female mosquitoes of the Aedes type. The susceptibility of an dengue epidemic outbreak can be predicted by several factors such as atmospheric conditions, seasons, hygiene and cleanliness of the area and the types of water bodies present in surrounding. The Government of India has taken many steps towards the avoidance and cure, yet technology can also provide a solution. Hereafter our application will let you know the status of dengue risk index at your current location and surrounding locations. Application will use GPS for finding the current location of user and thereafter through calculations from factors like previously encountered dengue cases, Atmospheric conditions and hygiene conditions in the specific area it will calculate and show the dengue risk index to the user so that the user may know the susceptibility of infection. The intend of this application is specifically for general public but it canalso be used by the medical industry and hospitals to improvise their methods of preventing this disease. Application only requires a GPS enabled smart phone through which it can be useful to public living in areas most prone to dengue infection or the areas which have encountered dengue epidemic previously.

Keyword : - *GPS, Dengue, Crowd-sourcing, Dengue Risk Index.*

1. Introduction

Dengue fever, additionally called dandy fever, is a mosquito-borne infection that can lead to a severe flu-like illness. It is caused by four completely different viruses and unfold by Aedes mosquitoes. Dengue virus is established throughout the tropics and subtropics. Dengue fever is caused by a pandemic, and there is no specific medicine or antibiotic

to treat it. For typical breakbone fever, the treatment is directed toward relief of the symptoms (symptomatic treatment). Dengue fever may be a mosquito-borne sickness that happens in tropical and climatic zone areas of the globe. Mild breakbone fever causes a high fever, rash, and muscle and joint pain. A severe kind of breakbone fever, additionally referred to as dengue fever VHF, can cause severe bleeding, a sudden drop in blood pressure (shock) and death. Millions of cases of dengue fever infection occur worldwide annually. Dengue fever is most typical in geographic area and also the western Pacific islands, but the disease has been increasing rapidly in Latin America and the Caribbean. Researchers are working on dengue fever vaccines. For currently the most effective hindrance is to cut back dipteron environment in areas wherever breakbone fever is common.

Virus is the main reason behind causing dengue. There are no specific antibiotics to treat it. Dengue fever is not curable fever unlike some other fever. Symptoms and sign are the most observable factors for treatment of typical dengue fever.

These days many people are suffering from dengue. This fever has infection that comes from several sources which causes all four related dengue viruses. This condition wont to be referred to as extreme temperature

break - bone, because sometimes leads to severe combined and muscle discomfort. Dengue fever is transmitted from AedesAegypti mosquito that also causes yellow fever. Worldwide, dengue disease becomes again especially in European countries. Studies have shown that several factors are responsible for the revival of dengue heat such as uncontrolled urbanization, improving travel around the world, inefficient socio-economic conditions, and finally, climate change. The best possible treatment is to take complete rest and drink plenty of water. to avoid dehydration from forcing out and a high fever. No vaccine can protect against dengue fever. Only avoiding mosquito bites can prevent it. Anyone United Nations agency lives in or travels to Associate in Nursing at-risk space will use variety of how to avoid being bitten. Reduce the number of skin exposed by sporting pants, long-sleeved shirts, and socks, tucking pant legs into shoes or socks. The Aedes mosquito breeds in clean, stagnant water. Checking for and removing stagnant water will facilitate cut back the danger. Try to avoid being outside at dawn, dusk, and early evening.

1.1 Problem Statement

The problem is that people who travel a lot from one place to another place has no idea about the health condition of the new place. So they cn not take the required concern for secure themselves from dengue. This problem is not only limited to user but it also affects on government schemes. The government has to plan various schemes for the dengue pronged areas but due to insufficient data they cannot proper plan the scheme.

2. Related Research

2.1. Developing dengue index through the integration of crowd sourcing approach

This analysis aims at rising the prevailing dengue fever indices by developing AN rule that will use the variables moving absolutely the vector's lifecycle and observation them daily to come up with an improved dengue fever Index that will facilitate warn on the high risk of a dengue fever happening. Researchers tried to spot the factors influencing the behaviour of the dipteran carrier of the virus within the medicine context by generating indices supported the amount of mosquitos caught in a given number of traps set within a small urban area or based on the number of mosquitoes found in a household. The House (premises) Index (HI), the Container Index (CI) and the Breteau Index (BI) have been described as not effective in predicting dengue outbreaks.

The main downside of those strategies is that the undeniable fact that they are doing not take into account alternative variables related to the vector's lifecycle, landing habit and geographical extents. The developed index would use crowd sourcing data as an additional tool for the citizens to get involved in providing spatial information and specific attributes for more accurate predictions. Using the data published by the ministry of health Malaysia in the years of 2014 and 2015 for the state of Selangor, the federal territories of Kuala Lumpur and Putrajaya compared with other data; namely, the temperatures, rainfall and moon cycles. Our findings using the time series method of the improved dengue index show a correlation with the dengue cases time series.

The crowd sourcing app would in the future further enhance the identification of the hot spots with high dengue fever probabilities. In conclusion, displaying spatially on a map such forecasts approximately 50 days before the occurrence of the outbreak would be beneficial for authorities to carry out preventive measures.

2.2. Prediction of dengue risk index in a region using GPS based on dengue fever recorded and climatic factors.

The idea is to develop GPS-based dengue risk index app which is mainly used to predict the outburst of dengue diseases in user's location. The prediction is based on analysing climatic condition. The climatic parameters that are used in analysis are temperature, rainfall and humidity. Linear regression algorithm is used to extrapolate in the multidimensional space to predict the threat of dengue exploration at user's location. The dengue risk index score will indicate and alert the user to take some immediate precautionary measures to prevent from dengue infection.

2.3. Dengue notification system using fuzzy logic

Dengue fever is a disease which is hard to identify, it is only detectable when the patient is at the critically ill. This study uses a formal logic approach for the patient to induce any notification if they're suspected with dandy fever. The study will suggest the patient whether to go or not to go to the hospital for further diagnosis. A doctor operating within the vector unit was chosen to be interviewed as a site knowledgeable for this project on get knowledge concerning the dandy fever} disease. Fuzzy logic can participate as AN illation engine during this study

that's applied to the principles of a mental object among a fuzzy or a crisp rule-based to determine whether the patient is suspected with dengue fever or not. The results and findings from the study had shown that the technique of formal logic will contribute a reliable end in order to apprize the unwellness. Human subject has been accustomed take a look at the system. This is thought-about to be quite happy furthermore as reliable system. The system can be applied at the UiTM medical unit. It is user friendly and most vital is employed by users to induce self notified with none assistant.

3. Proposed Solution

The proposed system will be an android application which will help user by signifying the dengue risk index of the particular location and it will also display the minimum distance from where the dengue patient was detected. It will help user to take several precautions for dengue.

Start the process by just doing registration on application. After doing log in the user must provide his location to the application. After getting the location, application provide you options such as user wants to see the nearest dengue patients or user wants to notify about any dengue patients.

Based on the option selected by the user it will ask for several information from user. If user want to notify the dengue patient then application will demand age of the patient, gender, symptoms and most importantly it will require the location of the patient. After filling all the data user will done with the notifying patient. It will also require some factors which will needed to calculate dengue risk index.

If user wants to check the risk of the dengue in particular location then it only needs location. In best case user wants to know risk of his own area then then application will automatically detect its location and show the user dengue risk index which is calculated on the basis of data provided by other users and it will show the nearest dengue patient. The application will also display the prevention techniques according to the risk of that area. Hospitals can also register on application to provide the data about patient and prevention technique.

The main part of the solution is calculation of dengue risk index of an area. For calculating dengue there are some factors which affect most for increasing dengue risk.

3.1. Calculation of Dengue Risk Index

Dengue risk index of a particular area can be calculated by following factors:

1. Atmospheric condition(Humidity).
2. Rainfall.
3. Hygiene/Cleanliness/Sanitation.
4. Temperature.
5. History of dengue outbreak in the area.

All the factors has significant impact on the growth of Aedes mosquitos which are responsible for spreading dengue. The factors are given equal percentage so that they can predict the susceptibility of dengue ,each factor is given a 20% weight age thus forming a scale of total of 100 on which the Dengue Risk Index will be mapped. The scale will compromise of all the factors which will be given by the user itself. If the user fails to provide any of the value to the factor then the system will automatically give the predefined value to the factor.

The formulae for Calculating the Dengue Risk Index can be given as:

RI = AC + Ra + H + T + HDO.

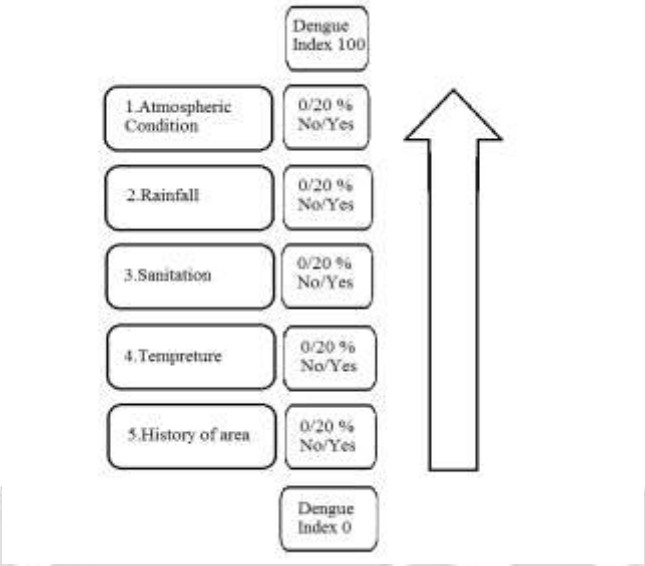

Figure 1: Calculation of Dengue Risk Index

Where:

RI : Dengue Risk Index (Out of 100%),

AC = Atmospheric conditions with a weight age of 20% present at the area, with the value 0 if the area is having low humidity.

Relative humidity having values in (RH%) from

Ac = 0 for 0% to 10% humidity {0<(0)<10}

Ac = 5 for 10% to 34% humidity {11<(5)<34}

Ac = 10 for 35% to 58% humidity {35<(10)<58}

Ac = 15 for 58% to 84% humidity {59<(15)<84}

Ac = 20 for 84% to 100% humidity {85<(20)<100}

Ra = Rainfall with a weightage of 20% experienced at the area, with a value of 0 if the area is having rainfall between 750mm to 1125mm.

Rainfall having value (in mm) from

Ra = 0 for 150mm to 270mm {150<(0)<270}.

Ra = 5 for 270mm to 390mm {270<(5)<390}.

Ra = 10 for 390mm to 510mm {390<(10)<510}.

Ra = 15 for 510mm to 630mm {510<(15)<630}.

Ra = 20 for 630mm to 750mm {630<(20)<750}.

H = Hygiene or Sanitation of the area marked in the scale of 20% , with value decreasing for slums.

Hygiene of the areas:

H = 20 for rural slums.

H = 15 for urban slums .

H = 10 for rural areas

H = 5 for urban areas.

H = 0 for rural and urban posh areas.

T = Temperature of the area with a weightage of 20%, having higher values if the temperature ranges between 22 degree to 32 degree Celsius of the area.

T = 0 for temperature lower than 10 and higher than 40.

T = 10 for temperature between 10 to 25 or 35 to 40.

T = 20 for temperature between 25 to 35.

HDO = History of dengue cases encountered in the area, with a value of 0 if the area encountered very less or no cases of dengue based on its population.

HDO = 5 for 1% of Population.

HDO = 10 for 2% of Population.

HDO = 15 for 3% of Population.

HDO = 20 for 4% of Population and above.

4. Conclusion

The dengue index will be a good way to quantify the probability of an outbreak. Given the fact that all the data provided in by the application will help to inform the population about the high risks of the outbreaks. The importance of such confirmation is critical in fighting against the dengue fever.

The proposed enhanced dengue Index requires regular updates through daily data feeds. Gathering other data such as temperature, rainfall and moon phases can be achieved easily through existing weather services. The enhanced dengue index takes in consideration temporal and spatial factors.

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