

# Flood Prediction Using Wireless Sensor Network in Disaster Monitoring

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**ABSTRACT:** In this paper a simpler way of detecting flood has been introduced. It is based on the JAVA API and Linear regression algorithm where the live weather details are fetched from the weather information API. The collected live weather data and the previous details of the weather in a particular place are passed to the linear regression algorithm to predict the current chances of disaster occurrence. If there is a chance of occurrence of the disaster then it is predicted and represented in graph with the percentage of chance. The information is provided to the concerned authority or person of that particular place where the information can be forwarded to the people of the area and save their lives.

**KEYWORDS:** Flood, JAVA API (Application Programming Interface), Linear Regression.

## I. INTRODUCTION

The goal of this project is to provide an alert to the people before disaster occurs and save their lives. In this system we use an API to fetch the live weather details and linear regression algorithm to predict the chances of the disaster occurrence. Disaster monitoring is a very important task in the world for which the different technologies have been introduced. WSN plays a major role because it is scalable and adaptable to the various scenarios. This paper presents the flood information based on the rainfall and weather factors at various places of Karnataka. As a recent disaster has occurred in Kodagu (Dist) Karnataka (state) in 2018. In this project the previous 15 years of data is collected regarding the rainfall, temperature and wind variation with the current weather details of the particular place.

## II. LITERATURE SURVEY

K. P. Georgakakos has proposed the innovative ideas in three engineering research areas: (a) spatially-distributed quantitative rainfall prediction, (b) spatially-distributed flow prediction, and (c) long-term flow prediction for water resources[2]. According to Muhammed Ali Sit and Ibrahim Demir hydrological models are used to identify the water level of stream to predict the chance of flood occurrence and the result is predicted using neural network[3].

D. Mioca, B. Nickerson, E. MacGillivray, A. Morton, F. Antond, D. Frasier, P. Tang, G. Lianga presents the development of a Web GIS based system for early warning and mapping for flood disasters and performs hydrological modeling to predict the chance of occurrence of flood in next 24 hours[4].

Authors Nor Azlina Ab. Aziz, Kamarulzaman Ab. Aziz proposed a method for disaster prediction with rescue and alert system and also proves that WSN is a prominent technology for disaster prediction[7].

# International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

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Vol. 8, Issue 5, May 2019

## III. EXISTING SYSTEM

The live weather data for flood prediction is fetched from the sensors that placed in a particular place. The current weather details are passed to the predicting system and chance of occurrence of disaster will be predicted. The alert message is passed using GSM module[7].

## IV. PROPOSED SYSTEM

To save peoples life earlier the disaster is detected ex: Flood. To predict the disaster we need live weather information which is fetched from a JAVA API using city id or city name and stored in the database based on day, month and year. There are two modules admin and user, where admin can update and view the current weather details which is obtained from an API. The information is fetched based on the parameters such as mintemp, maxtemp, wind, clouds, rain, pressure, humidity. The major parameter is rainfall passed to the linear regression algorithm to identify the percentage of occurrence of the disaster based on the rainfall. After obtaining the percentage of flood chances it is informed to the concerned authority. And also sends an alert message to the people of that particular place.

### (a) FLOOD

When there is flow of water in huge amount due to heavy rainfall or by the overflow of rivers, lakes etc flood occurs. It mostly affects the agriculture land and crops also natural calamities. It is also caused due to damage of dams or when more water is stored than the capacity of the dam.

The major problem is to predict the chance of occurrence of flood earlier and also to save lives and natural calamities. In this project we detect the flood earlier by considering the main parameter as rainfall rate.

### (b) WIRELESS SENSOR NETWORK

Wireless sensor networks (WSN) is used for analyzing of real time events. It is scalable has less maintenance cost and is adaptable for different conditions. But it has less memory and power. By using the sensors we can fetch the live weather information data which is performed by the API also by using satellite. In this project we fetch data from API.

### (c) API

Application Programming interface(API) includes a procedural code by using that code a new application can be created and accessed. It acts as a messenger for delivering the requests to providers that we request and responses back. An API means functionalities which are independent of their implementations and definitions to vary without compromising each other. A good API helps makes the development easier by proving the building blocks for the program. API also enables the developer to create apps using the available information. It reduces the complexity of code and it can be used repeatedly.

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Vol. 8, Issue 5, May 2019

## (d) API call with the API key implementation

To call an API an API key is necessary because without the key the request cannot be processed.

### Call for an API:

<http://api.openweathermap.org/data/2.5/forecast?id=524901&APPID={APIKEY}>

In above example APPID and APIKEY is considered as a different key for each call.

### Calling API using APPID:

[api.openweathermap.org/data/4.6/forecast?id=487625&APPID=1110000](http://api.openweathermap.org/data/4.6/forecast?id=487625&APPID=1110000)

001 Current weather of a location can be called using city name or city id.

[api.openweathermap.org/data/4.6/weather?q={city name},{country code}](http://api.openweathermap.org/data/4.6/weather?q={city name},{country code})

Ex: [api.openweathermap.org/data/4.6/weather?id=3596472](http://api.openweathermap.org/data/4.6/weather?id=3596472)

## V. ALGORITHM OF LINEAR REGRESSION

Machine learning includes an algorithm called as Linear Regression. It comes under the supervised learning and task of regression can be performed. We can predict the target using independent variables. Regression model depends on the relationship between the dependent and independent variables.

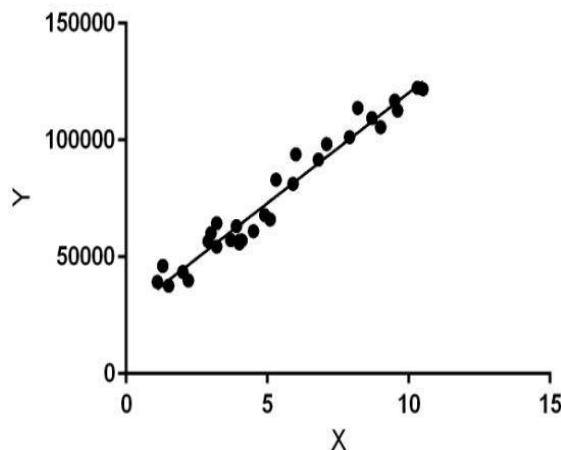


Fig.1. Graph of linear regression (LR algorithm).

In above graph Y-axis represents the dependent variable and x-axis represents the independent variable. Where regression finds the independent variable value. Therefore the relation between X-axis and Y-axis in the form of linear prediction. Where X-axis is the rain rate and Y-axis is the flood rate according to the experiment.

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Vol. 8, Issue 5, May 2019

$$y = \theta_1 + \theta_2 \cdot x$$

Fig.2. Linear Regression formula.

## VI. EXPERIMENTAL RESULTS

The studied algorithm is implemented by the software Netbeans 8.0. Lets discuss the data used and result set.

### (a) DATA SET

Experiment is conducted by using the weather data which consists of temperature, humidity, pressure, wind, clouds and rainfall data. Based on rainfall data the flood rate will be detected.

WEEK RAIN RATE (mm)	FLOOD RATE(%)
81.9	15
82.2	15
83.1	15.1
83.5	16.45
84.2	16.44
85.7	16.92
86.3	17.7
90	18.9

Table 1. Dataset

The rain dataset is fetched from the API and stored in the database where the week rain rate is collected from the database and passed to the algorithm to predict the chances of flood based on the rainfall rate.

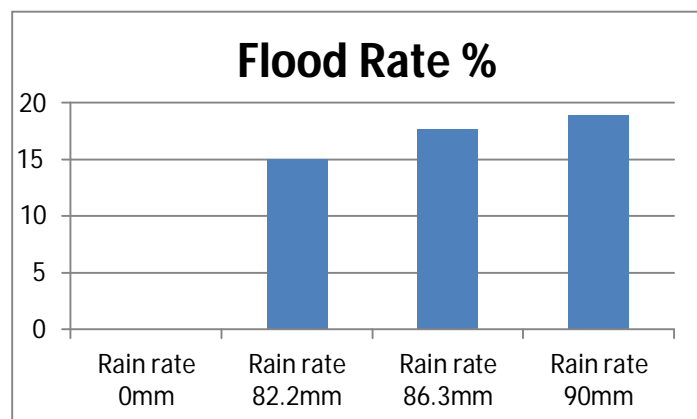


Fig 3. Performance measure.

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Vol. 8, Issue 5, May 2019

In the above graph x axis represents the rain rate in mm and y axis represents the flood rate in percentage (%).As the result of algorithm based on the rain rate the flood rate is predicted and represented in the above graph.

## VII. CONCLUSION

Flood prediction using wireless sensor network is a challenging research where in this work the disaster is predicted earlier by considering the various factors to save the nature and peoples life. It can be extended for various regions by using JAVA API and the live data can be fetched using sensors for accurate results.

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