

Survey on Flood Management System

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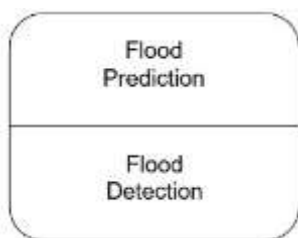
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Abstract – Flood is very commonly occurring disaster affecting a lot of people across the globe. Therefore, flood risk assessment and severity detection become a serious concern, which can reduce the damage or effects caused by floods. This assessment and detection can help in predicting the flood situation, generating the early warning, handling the disastrous situation, providing the immediate help and performing rescue operation in flooded region. Hence, flood prediction and flood detection become more concerning elements. Data mining algorithms are applied to predict the possibility as well as severity of flood. Also, with the help of IoT elements and cloud techniques flood detection is achieved. There is list of methods to predict and detect the possibility of flood. The considered methods are explained as existing work.

Key Words: kNN Algorithm, SVM Algorithm, GSM Module, IoT

1. INTRODUCTION

Flood is disastrous natural calamity. It affects daily life in multiple ways such as loss of lives and property, loss of livelihoods and also leads to psychological effects. Flood is caused due to heavy rains and improper management might lead to permanent damage. In recent years, flood prone area can be easily identified due to its geographical structure. Poor town management leads to blockages in sewer system which stops the outflow of water. Flood is not easily detectable or predictable in particular locality. Delayed acknowledgement of flood leads to great loss of life as well as wealth. So, to reduce the adverse effect of flood, early detection and prediction is necessary. System can be divided in two parts, i.e. Flood Prediction, Flood Detection.

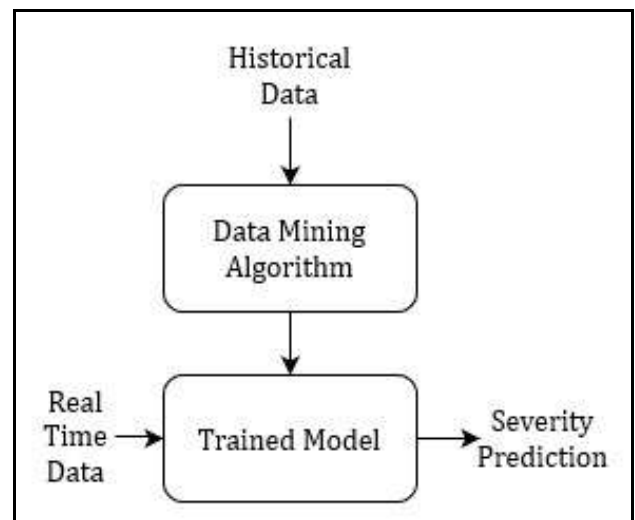


Flood Management System

1.1 Flood Prediction

Advanced prediction of flood can reduce disastrous effect by informing the people of particular locality. With the help of historical data of rainfall, water level of reservoir in particular locality and using data mining algorithms like kNN and SVM, the model can be trained. By taking real time data of such

parameters, the severity of possibility of flood can be predicted. WEB-TEXT API or Push Messages can be used to inform people living in that locality.



Flood Prediction Module

1.2 Flood Detection

Flood Detection can be implemented by using IoT Nodes and Cloud services. By using water level sensor, water level of the reservoir can be fetched by using microcontroller. GSM module is used for communication between microcontroller and cloud services. Computation can be performed at cloud level by using the real time data fetched from microcontroller. Then, flood can be detected if the data crosses threshold value. People in particular locality can be alerted by sending messages as well as by using warning sound in the locality.

2. LITERATURE SURVEY

Study of various data mining algorithms is done for the prediction purpose. Also, various kinds of research are done previously for early detection of flood. The historical data can be trained with help of various classifier needed for prediction. Selecting fast as well as accurate classification algorithm is very important in prediction operation. In recent years, kNN and SVM classifiers have proven their efficiency and accuracy.

Support Vector Machine (SVM) is more accurate and one of the robust algorithms for various machine learning approaches and efficient training methods are being developed at faster pace to support SVM[1]. By separating

hyperplane, SVM classifier is formally defined. A Support Vector Machine (SVM) performs classification by finding the hyperplane that maximizes the margin between the two classes[8]. It performs best in context of accuracy and it is advanced as it can correctly classify future data. Computational inefficiency is the downside of the SVM algorithm. As the number of parameters increases, computational cost also increases resulting bad computational efficiency[1].

kNN is popular classification technique for easy understanding and implementation. kNN classifier works by finding k objects in the training set that are nearest to the test object. A well-known result by Cover and Hart [2] shows error of nearest neighbor rule is bounded above by twice the Bayes error under certain reasonable assumptions. kNN is suitable for applications where an object can have multiple class labels. Some researchers have found that kNN outperformed SVM [3]. Selecting value of 'k' is one of the major issues that can affect the performance of kNN algorithm. A small value of k means that noise will have a higher influence on the result and a large value make it computationally expensive[1]. Data scientists usually choose as an odd number if the number of classes is 2 and another simple approach to select k is set $k = \sqrt{n}$ [7], where n is the number of items in the dataset.

Early flood detection helps to reduce the adverse effect of flood. IoT nodes along with cloud services can be useful to detect the flood. The system has three modules, i.e. hardware module, software module and database module. Hardware module contains microcontroller, Sensor nodes and power supply. Software module contains cloud architecture, web application and android application. In Database module, registered user's data and data from sensors is stored[3]. Data collected by the sensors is collected and calculated using Microcontroller and send it to the cloud server using ESP. The received data is stored on the database. Web application and mobile application uses stored data. The proposed system increases accessibility for assessment of flood situations and efficiency[4]. GSM module can be used for sending alert messages via SMS. In this, system detects water level and measure the speed of rise of water level. Then, measurement result is sent to a mobile phone through Short Message Service (SMS)[5].

Table -1: Comparison Table

Title of Paper	Year	Seed Idea
Top 10 algorithms in data mining	2007	-Description of different data mining algorithms with their impact, pros and cons.
Flood Alert Management System Using IoT and Microcontroller	2017	-Description of various IoT nodes used for flood monitoring.

The Implementation of an IoT-Based Flood Alert System	2018	-Information of implementation for alert system using microcontroller and GSM module.
A Real Time Solution to Flood Monitoring System using IoT and Wireless Sensor Networks	2019	-Use of ultrasonic sensors and microcontroller for detecting flood in flood prone areas.

3. CONCLUSION

In this paper, discussion on data mining algorithms such as kNN and SVM is done for prediction of flood severity. Also, for flood detection, different IoT techniques and cloud services are identified. Alert system for flood detection and prediction is also discussed for alerting the people.

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