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IOT Early Flood Detection and Avoidance

M.Maharaja¹, N.Divya², N.Indraja³, P.Revathi⁴

Assistant Professor, Department of Electronics and Communication Engineering, Adhiyamaan College of Engineering, Krishnagiri, Tamilnadu, India¹

UG Scholars, Department of Electronics and Communication Engineering, Adhiyamaan College of Engineering, Krishnagiri, Tamilnadu, India^{2,3,4,5}

ABSTRACT: Floods are basic ruinous events that enable extreme desolation of any nation. They're generally caused by precipitation and overflow of waterways, particularly throughout significant stormy seasons. This project aims to observe the flood condition and send an alert if there's an incident of risk through IOT. The measure of rising water level is finished to find the flood. The system uses 3 sensors to find temperature, wetness and water levels at each stage. The detected detector values are unit processed victimisation PIC Microcontroller and it's transmitted to IOT through Wi-Fi module. The system in a flash uploads and broadcast detector values through cloud. The choice tree rule is enforced to perform the classification method. The experimental results for properly Classified Instances and Minimum Absolute Error indicates that the planned call Tree rule provides ninety nine.6% classification accuracy with Minimum Mean sq. Error than HyperPipes rule.

KEYWORDS: Flood Detection System, detector knowledge, PIC Microcontroller, IOT, call Tree.

I. INTRODUCTION

Flood is taken into account as a standout amongst the foremost well-known characteristic marvel on the world, touching human lives and creating outrageous damage to individuals and properties [9]. Maintaining a strategic distance from floods before extreme damage will provide adequate time to occupants empty within the close-by regions. The Prediction and cautioning system might have potential impact to decrease the intense of flood influences.

In an exceedingly massive portion of the developing nations, flood checking cells aren't licitly outfitted with savvy and versatile flood worrying frameworks. Therefore, people from flood-influenced zones are unit enduring the results of flood every year. This ruinous event cannot be loose anyway appropriate overseeing and pre-disturbing systems will reduce its reality [10]. The most objective of this project is to develop and style a flood finding system that may detect flood mechanically and transmits knowledge through IOT. Area unit collected from detector knowledge that is trained and classified victimisation call Tree rule. Performance metrics like properly classified instances, incorrectly classified instances, letter statistics, Mean Absolute Error, Relative mean absolute error area unit obtained for many detector knowledge values shows higher classification accuracy than the Random.

II. RELATED WORK

The idea of image inpainting was 1st introduced by Bertamio et al. [1]. The tactic was impressed by the important inpainting method of artists. The image smoothness data interpolated by the image Laplacian is propagated on the isophotes directions, that square measure calculable by the gradient of image turned by ninety degrees. Good example primarily based technique planned by Criminisi et al. [2] used a best good example patch to propagate target patch as well as missing pixels. This method uses associate approach that mix structure propagation with texture synthesis and therefore made superb results. In [3], the authors decompose the image into add of 2 performs so reconstruct every function one by one with structure and texture filling-in algorithms. Morphological technique is employed to extract text from the photographs bestowed in [4]. In [5], the inpainting

technique is combined with the techniques of finding text in pictures and a straightforward algorithmic rule that links them. The technique is insensitive to noise, skew and text orientation. The authors in [6] have applied the CCL (connected element labelling) to find the text and quick march algorithmic rule is employed for Inpainting.

The add this paper is split in 2 stages. 1) Text- Detection 2) Inpainting. Text detection is finished by applying morphological open-close and close-open filters and combines the photographs. Thereafter, gradient is applied to find the perimeters followed by thresholding and morphological dilation, erosion operation. Then, connected element labelling is performed to label every object one by one. Finally, the set of choice criteria is applied to separate non text regions. once text detection, text inpainting is accomplished by mistreatment good example primarily based Inpainting algorithmic rule.

III.METHODOLOGY

To find a flood the system observes numerous natural factors, which incorporates humidness, temperature, water level and flow level. to gather knowledge of mentioned natural factors the system comprises totally different sensors that collects knowledge for individual parameters. For police work changes in humidness and temperature the system contains a DHT11 Digital Temperature humidness device. it's a advanced device module with consists of resistive humidness and temperature detection elements. The water level is often beneath observation by a inaudible device, as water levels rise and fall. The flow device on the system keeps eye on the flow of water. The water flow device consists of a plastic valve body, a water rotor, and a hall-effect device. once water flows through the rotor, rotor rolls. Its speed changes with totally different rate of flow. All the sensors square measure connected to Wi-Fi microcontroller , that processes and update the knowledge in on-line issue speak webpage. The system has Wi-Fi feature, that is beneficial to access the system and its knowledge over IOT webpage

IV.EXPERIMENTAL RESULTS

Figures shows three shows the experimental setup of this method. The implementation of flood detection and notification system has been projected. the most dominant unit PIC microcontroller and totally different devices square measure been connected with controller to find the sensor knowledge values. Finally, these values square measure send to cloud through ESP8266 module.



Fig.3 Experimental Setup

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B.Hardware Results

The detected sensor values are displayed on LCD which is shown in Fig. 4.



Fig.4 Sensor values display on LCD

Also these data are transmitted to IOT through Wi-Fi module. The system continuously uploads and broadcast sensor values to the cloud about water condition.



Fig.5 Values in cloud for temperature and humidity

Fig. 5 shows the detected temperature and humidity sensor values uploaded on the cloud



Fig.6 Values in cloud for three level Probe sensor

The detected three level Probe sensor values are uploaded on the cloud is shown in Fig. 6 which shows the normal or risk condition of flood level.

V.CLASSIFICATION RESULTS

round a hundred and twenty Datasets of various sensing element values ar been taken and it's processed during this projected work. the choice Tree Machine learning algorithmic program is enforced for classifying flood

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knowledge with efficiency by utilizing wood hen human platform. varied parameters ar been measured and tabulated for obtained sensing element knowledge..

A.Confusion Matrix Analysis

The confusion matrix has been evaluated to analyse the knowledgeset taken from flood knowledge for quantifying the projected Machine learning approach so as to see the classified flood data. during this analysis, the 2 algorithmic programs were enforced like call tree and HyperPipes algorithm..

$$Accuracy = \frac{TP+TN}{(TP+FP)+(TN+FN)} \tag{3}$$

The Equation (4) is employed to work the extent of positive cases to seek out properly classified instances.

$$True\ Positive = \frac{TN}{TN+FN} \tag{4}$$

Equation (5) is employed to calculate the proportion of negatives that were incorrectly classified instances.

$$False\ Positive = \frac{TN}{TP+FP} \tag{5}$$

Equation (6) shows true negative to calculate properly classified positive instances..

$$True\ Negative = \frac{TN}{TP+FP} \tag{6}$$

Equation (7) shows False negative to calculate incorrectly classified negative instances.

$$False\ Negative = \frac{FN}{FN+TN} \tag{7}$$

TABLE I. COMPARATIVE ANALYSIS OF CLASSIFIER OUTPUT

Parameters	HyperPipes Algorithm (Existing Algorithm)	Decision Tree Algorithm (Proposed Algorithm)
Correctly Classified Instances	89.35%	99.62%
Incorrectly Classified Instances	10.65%	0.38%
Kappa statistic	0.7942	0.9835
Mean absolute error	0.4599	0.0212
Root mean squared error	0.4667	0.0910
Relative absolute error	93.6543%	3.9426%

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Root relative squared error	92.6775%	19.8559%
Total Number of Instance	805	805

Table one shows the comparative analysis of planned call Tree formula that processed exploitation wood hen Explorer.

From the higher than results, it's inferred that the choice Tree formula enforced in machine learning code produces properly classified instances with ninety nine.6% of accuracy whereas, the incorrectly classified instances area unit zero.38% severally with minimum Mean absolute error than the HyperPipes formula. The formula produces high classification accuracy throughout the prediction of tree attribute due to calculative the knowledge gain and entropy with efficiency even for enormous datasets. Its specificity is exaggerated by verificatory all potential outcomes of every call category label effectively. additionally it reduces modelling error and putting in place parameters is easy in amid grouping.

TABLE II. ACCURACY OF CLASSIFICATION

Accuracy By Class	HyperPipes Algorithm (Existing Algorithm)	Decision Tree Algorithm (Proposed Algorithm)
True Positive	1	0.993
False Positive	0.165	0.013
Precision	0.125	0.998
Recall	1	0.993
ROC Area	0.982	0.997

The accuracy is outlined by properly classified instances or prevalence of true worth outcomes once classification. Further, it might be determined by calculative Sensitivity, Specificity, False Negative and True Negative severally Table a pair of shows the accuracy of categoryfication by class in terms of parameters like True Positive indicates sensitivity whereas, False Positive indicate the specificity and additional exactitude, Recall, mythical creature space has been calculated. From the higher than results, it's inferred that the planned call Tree formula produces terribly low true positive and false positive rate, therefore the classification accuracy is incredibly abundant bigger than the HyperPipes formula. so as to scale back truth positive rate, the categoryifier statistically derive the result wherever the model properly predicts the positive class or properly classified instances whereas for reducing false positive rate, the categoryifier ought to derives the negative class with efficiency.

VI.CONCLUSION

He design and implementation of flood detection and notification system supported call Tree formula is planned during this work. The system divides the flood level into 3 stages for gathering information from sensors that is

processed exploitation PIC Microcontroller. At each amendment in sensing element values, the system ceaselessly updates and broadcast those information to the cloud. The implementation and comparison of call Tree and HyperPipes formula square measure created for around one hundred twenty informationsets of sensing element data collected from completely different sensors. The analysis of flood information were administrated to classify from typical and at dangerous condition during which the planned call Tree formula provides higher classification accuracy with lesser risk of error than HyperPipes classification..

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BIOGRAPHY



Mr. M. Maharaja,
Assistant Professor,
Engineering Department,
Adhiyamaan College of
Engineering,
Anna university

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N. Divya,
Electronics And Communication
Engineering Department,
Adhiyamaan College of
Engineering,
Anna university.



N. Indrāja,
Electronics And Communication
Engineering Department,
Adhiyamaan College of
Engineering,
Anna university.



P. Revathi,
Electronics And Communication
Engineering Department,
Adhiyamaan College of
Engineering,
Anna university.



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