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An Intelligent Fire Warning Application Using KNN

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Abstract: Design and implementation of fire warning and alarm systems for detecting true fire accidents with classified false alarms. The KNN algorithm is used to detect the true presence of fire. In this System mainly two phases. The first phase of Machine Learning and the other phase consist of a IOT. The Internet of Things (IoT) is very helpful for predicting and monitoring this kind of situation. As it can work with real time data as well as the past data that was recorded earlier. This IoT sends data through Wireless Sensor Network (WSN) to the computational devices so that the result can be generated. Thus many have moved from physical parameter fire prediction to real time computational monitoring. The proposed system uses different atmospheric sensors such as humidity, temperature, smoke and flame. The recorded data is stored and passed to the device and thus the result is obtained. This system has been applied to the arduino Uno micro-controller. Sensors are used to collecting data & these data were transferred to arduino Uno microcontroller board. The GSM module alerts the fire warning via SMS.

Keywords: IOT, FDWS, Multi-Sensor, KNN, MATLAB, ThingSpeak.

I. INTRODUCTION

In past year, false fire warning accident has a very big problem and caused damage including being effected human life. Some Smart fire alarm system are sometime called false warning then false warning can be serve as the original signal. There are mainly two types of fire alarm systems Conventional and address appropriate, but sometime this fire alarm system generates false warning. False alarms have a higher proportion of addresses than traditional alarm systems, but address-appropriate alarm fire systems are more expensive. Making the right decisions and reducing the number of false alarms, an artificially trained cost-effective multi-sensor specialist alarm system is needed. The designed fire alarm system could detect any kind of fire, heat, smoke and generate an alarm Signal and SMS directly send to the smartphone user's or the proper authorities via GSM to take necessary action immediately. With use of an Arduino Uno R3 (Arduino) microcontroller board based on Atmega328p. It is easily available and programming using a set of effective sensors using with Arduino software. All sensors are connected to the Arduino Uno board. I have used ThingSpeak. ThingSpeak is an open-source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP and MQTT protocol over the Internet or via a Local Area Network. ThingSpeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates. ThingSpeak has integrated support from the numerical computing software MATLAB from MathWorks, allowing ThingSpeak users to analyze and visualize uploaded data using Matlab without requiring the purchase of a Matlab license from Mathworks. ThingSpeak has a close relationship with Mathworks, Inc. In fact, all of the ThingSpeak documentation is incorporated into the11 Mathworks' Matlab documentation site and even enabling registered Mathworks user accounts as valid login credentials on the ThingSpeak website. The terms of service and privacy policy of ThingSpeak.com are between the agreeing user and Mathworks.

II. LITERATURE SURVEY

Sarera Sarwar et al.(2019)have purpose a system [1] "An Intelligent Fire Warning Application Using IOT and ANFIS" An Adaptive neuro-fuzzy Inference System (ANFIS) is used in this paper to calculate the maximum likelihood of the true presence of fire and generate fire alert. The novel idea proposed in this paper is to use ANFIS for the identification of a true fire incident by using change rate of smoke, the change rate of temperature, and humidity in the presence of fire. The model consists of sensors to collect vital data from sensor nodes where Fuzzy logic converts the raw data in a linguistic variable which is trained in ANFIS to get the probability of fire occurrence. The proposed idea also generates alerts with a message sent directly to the user's smartphone. The primary objective of this system is to develop a reproducible and economical solution with minimum false alarms and a system that alerts via GSM (global system for mobile communication). The innovative idea is to use neuro-fuzzy logic to design a smart alarm system.In system is ANFIS-simulated in MATLAB environment; the obtained results show effectiveness and the robustness with good performances compared with the FIS method.

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In 2020,et al. [2] author A.Vidya, P.Malini, S.Sathiya has implementation IOT Based Forest Fire Detection And Early Warning System Using Raspberrry Pi And GSM Camera is used to capture the fire image when a fire incident happens. The pixels in the Flame calculated using Hue Intensity Saturation color model.HSI rules were used for segmenting fire regions. Fire aliases can be avoided by seperating the pixels that have low intensity and low saturation in segmented fire regions. This method detects fire flames from test videos within a second.

In 2019,et al. [3] author Ngonidzashe A Mwedzi, Nwulu and Lekan Gbadamosi has created Machine Learning Applications for Fire Detection in a Residential Building. This application Suggestions of artificial intelligence algorithms for detecting fire using fire detection shaped characteristics from video footage A novel presents an intelligent fire detection system method.CNN network aims to achieve good image classification performance, minimal false alarms and high fire detection rates. VGGNET architecture has come from the CNN network. Through the application of CNN and VGINET technologies, better results were obtained by reducing system accuracy and false alarms by 85%.

In 2018,et al. [4] author S.R.Vijayalakshmi, S.Muruganand has implementation fire alarm based on spatial temporal analysis using fire video. spatial analysis is to reduce the error the introduction of a red object that has a pattern of movements such as fire in the temporal analysis. fire or smoke coloured remove using pixels colour based on HSV model. Spatial and temporal analysis is applied to smoke and fire frames to detect smoke and fire. It is tested with 10 different videos of smoking and non-smoking as well as videos of fire and non smoke and it detects 8 out of 10 frames correctly and the search rate is 80%.

Ke Chen et al. [5] (2019) have proposed Research On Image Fire Detection Based On Support Vector Machine(SVM).An image fire detection algorithm based on support vector machine is proposed by studying the features of fire in digital image. Firstly, the motion region is extracted by the inter-frame difference method and regarded as the suspected fire area. An image fire detection algorithm based on Support Vector Machine (SVM) is proposed based on the establishment of positive and negative fire samples data sets. In order to overcome the shortcomings of holes in the flame area, the algorithm uses scene classification method in remote sensing field to bring some background to the flame area then extracts the RGB feature, texture feature and color moment of the flame to get the feature vectors, and finally inputs the support vector machine model which trained before for fire judgment. The simulation results show that the algorithm can overcome the weaknesses of color model segmentation and improve the accuracy of detection. The basic idea of support vector machine classification algorithm is to find a hyper plane in space that can separate all data samples and maximize the distance between sample data points and hyper planes. The main steps of the support vector machine-based image fire detection algorithm adopted first of Read images and the motion region is extracted by frame difference method and used as fire suspected area, and then pre-processed. Then Resembling for the same size, extracting flame features including H component first moment feature, texture feature, colour moment feature, etc. Then normalize the extracted data to get the eigenvector. Then last using the support vector machine model which trained before to judge. Python language is used to program and realize the small program of fire detection.

III. PROPOSED WORK

K-Nearest Neighbor (KNN) is one of the simplest Machine Learning algorithms based on Supervised Learning technique. KNN algorithm assumes the similarity between the new data and available cases and put the new case into the category that is most similar to the available categories. K-NN algorithm stores all the available data and classifies a new data point based on the similarity. This means when new data appears then it can be easily classified into a well suite category by using KNN algorithm. KNN algorithm can be used for Regression as well as for Classification but mostly it is used for the Classification problems. K-NN is a non-parametric algorithm, which means it does not make any assumption on underlying data. It is also called a lazy learner algorithm because it does not learn from the training set immediately instead it stores the dataset and at the time of classification, it performs an action on the dataset. KNN algorithm at the training phase just stores the dataset and when it gets new data, then it classifies that data into a category that is much similar to the new data.

The K-NN working can be explained on the basis of the below algorithm:
Step-1: Select the number K of the neighbors.
Step-2: Calculate the Euclidean distance of K number of neighbors.
Step-3: Take the K nearest neighbors as per the calculated Euclidean distance.
Step-4: Among these k neighbors, count the number of the data points in each category.
Step-5: Assign the new data points to that category for which the number of the neighbour is maximum.

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Step-6: Our model is ready.

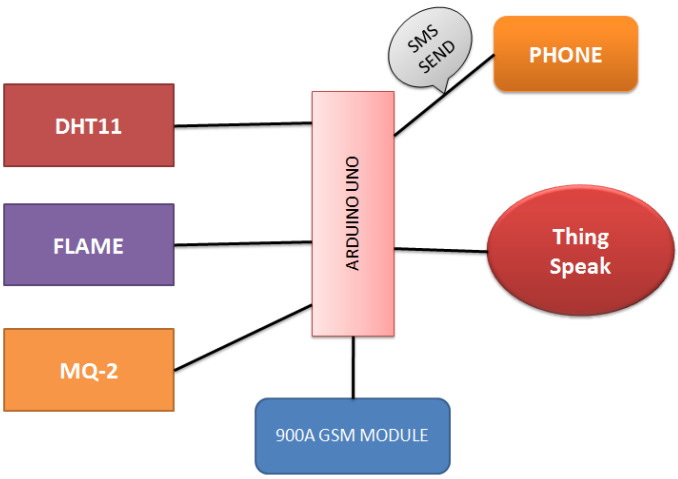

Fig 1. Simulation Diagram of FDWS

IV. ANALYSIS

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V. CONCLUSION

A fire alarm is a device that detects the presence of smoke-related fires and climate change. Fire alert operate to move people to a potential location in which a fire or smoke accumulates A different sound exists to hear the notification. The fire alarm created by this project work is reliable at low cost. Different authors have presented the purpose of different techniques and methodologies of this research. Further studies on wireless sensor technology on would be best to replace existing sensors. Moreover, the use of IOT it can enhance the system by talking to many other devices and smart warning systems such as send a message to a smart gas meter to interrupt the gas supply in critical situations, etc.

REFERENCES

[1]. Sarwar, Barera; Bajwa, Imran S.; Jamil, Noreen; Ramzan, Shabana; Sarwar, Nadeem. 2019. "An Intelligent Fire Warning Application Using IoT and an Adaptive Neuro-Fuzzy Inference System" Sensors 19, no. 14: 3150. https://doi.org/10.3390/s19143150

[2]. Vidya , P.Malini, S.Sathiya.IOT Based Forest Fire Detection And Early Warning System Using Raspberry Pi And GSM" . International Journal of Future Generation Communication and Networking Department of Electronics and Communication Engineering, K.Ramakrishnan college of Engineering,Trichy-621112.

[3]. N. A. Mwedzi, N. I. Nwulu and S. L. Gbadamosi, "Machine Learning Applications for Fire Detection in a Residential Building," 2019 IEEE 6th International Conference on Engineering Technologies and Applied Sciences (ICETAS), Kuala Lumpur, Malaysia, 2019, pp. 1-4, doi: 10.1109/ICETAS48360.2019.9117318.

[4]. S. R. Vijayalakshmi and S. Muruganand, "Fire alarm based on spatial temporal analysis of fire in video," 2018 2nd International Conference on Inventive Systems and Control (ICISC), Coimbatore, India, 2018, pp. 104-109, doi: 10.1109/ICISC.2018.8399002.

[5]. K. Chen, Y. Cheng, H. Bai, C. Mou and Y. Zhang, "Research on Image Fire Detection Based on Support Vector Machine," 2019 9th International Conference on Fire Science and Fire Protection Engineering (ICFSFPE), Chengdu, China, 2019, pp. 1-7, doi: 10.1109/ICFSFPE48751.2019.9055795.

[6]. Yang Zhikai, Bu Leping, Wang Teng, Ouyang Jinen,Yuan Peng"Fire Alarm for Video SurveillanceBased on Convolutional Neural Network and SRU". 2018 5th International Conference on Information Science and Control Engineering 10.1109/ICISCE.2018.00056

[7]. I. M. Reza Permana, M. Abdurohman and A. G. Putrada, "Comparative Analysis of Mesh and Star Topologies in Improving Smart Fire Alarms," 2019 Fourth International Conference on Informatics and Computing (ICIC), Semarang, Indonesia, 2019, pp. 1-5, doi: 10.1109/ICIC47613.2019.8985889.