**Emerging Methods for Early Detection of Forest Fires**

**Problem statement:**

Forest fires are a major environmental issue, creating economic and ecological damage while endangering human lives. There are typically about 100,000 wildfires in the United States every year. Over 9 million acres of land have been destroyed due to treacherous wildfires. It is difficult to predict and detect Forest Fire in a sparsely populated forest area and it is more difficult if the prediction is done using ground-based methods like Camera or Video-Based approach. Satellites can be an important source of data prior to and also during the Fire due to its reliability and efficiency. The various real-time forest fire detection and prediction approaches, with the goal of informing the local fire authorities

**Literature survey:**

**Treditional Methods :**

Forest fire detection and prevention are real problems faced by a number of countries. Different methods have been stated for monitoring the emergence of fires.

1. **Watch Towers**

In earlier days, the forest fires were detected by manual observations with watch towers installed in the isolated areas of forest. Though this method was accurate, it was not preferred due to manual restrictions.

1. **Satellite**

Based Systems Earth orbiting satellites have been used for detection of forest fires. Unfortunately, these satellites can provide the images of regions of the earth’s surface every two days which is a very long time for fire scanning. Also the weather conditions can affect the quality of satellite images.

1. **Optical Sensors and Digital Camera**

The use of optical sensors only provides a line of sight vision, where the vision can be blocked by high trees or hills. The Camera surveillance systems were also inefficient for forest fire detection because of short distance ranges

**D.Wireless Sensor Networks**

The sensors sense physical as well as chemical parameters. The sensors can operate in a self-healing and self-organizing wireless networking environment. The major problem with this system is that there are high chances of false alarms due to lack of proper processing of the sensor data. In this paper, we propose a method which processes the sensor data to predict fire accurately. The sensor nodes are provided with Wi-Fi devices and tested on grassy areas to sense temperature, humidity, pressure and various other physical parameters and send this data back to the base station. At the base station, the data is processed by a machine learning agent to give alaram.

**Literature survey**

[1]George E. Sakr, Imad H. Elhajj, George Mitri and Uchechukwu C. Wejinya “Artificial Intelligence for Forest Fire Prediction” 2010 IEEE/ASME International Conference on Advanced Intelligent Mechatronics Montréal, Canada, July 6- 9, 2010: This paper presented a forest fire risk prediction method. The findings show that a small quantity of data can be used to estimate forest fire risk.

[2]A. Kansal, Y. Singh, N. Kumar and V. Mohindru, "Detection of forest fires using machine learning technique: A perspective" 2015 Third International Conference on Image Information Processing (ICIIP), Waknaghat, 2015: The use of regression and the division of datasets has been proposed in this paper as a method for detecting fire. The algorithm achieves a low R-squared and a low root mean square error. This method could be used for other calamities in the future. The use of specific transformations may also help to increase the model's efficiency.

[3]Guruh Fajar Shidik and Khabib Mustofa “Predicting Size of Forest Fire Using Hybrid Model “ICT-Eurasia 2014: An alternative hybrid model capable of predicting the extent of forest fire has been developed in this study. The algorithm, which includes meteorological and forest weather index variables, has successfully classified the level of burning into three categories: No Burn Area, Light Burn, and Heavy Burn. The proposed model's examination revealed encouraging results in terms of accuracy. of confusion matrix around 97.50% and Kappa 0.961.

**References:**

[1] George E. Sakr, Imad H. Elhajj, George Mitri and Uchechukwu C. Wejinya “Artificial Intelligence for Forest Fire Prediction” 2010 IEEE/ASME International Conference on Advanced Intelligent Mechatronics Montréal, Canada, July 6-9, 2010.

[2] Mauro Castelli, Leonardo Vanneschi , and Ales Popovic “Predicting Burned Areas of Forest Fires: An Artificial Intelligence Approach” Fire Ecology Volume 11, Issue 1, 2015 .

[3] L. Yu, N. Wang, and X. Meng "Real-time forest fire detection with Wireless Sensor Networks," in Wireless Communications, Networking and Mobile Computing, 2005. Proceedings. 2005 International Conference on, vol. 2. IEEE, 2005, pp. 1214--1 217