HACK-A-THON

Fire Detection Using ML Algorithms

TEAM DETAILS

Team Name : August

College Name : R.M.D Engineering College (RMK Group of Institutions)

Team Members :

Swetha A - 111519104156

Sruthi R - 111519104151

Lavanya V - 111519104070

Nivethitha P - 111519104093

OBJECTIVE

- To increase the accuracy in predicting fire events, we will use various ML algorithms to check if there is fire or not.
- We will also train the machine and test by providing custom input whether there is fire or not.
- We will also calculate the accuracy, recall, and precision of these ML Algorithms.
- Hence we can save our environment ,animals and livelihood from the adverse results of forest fires.

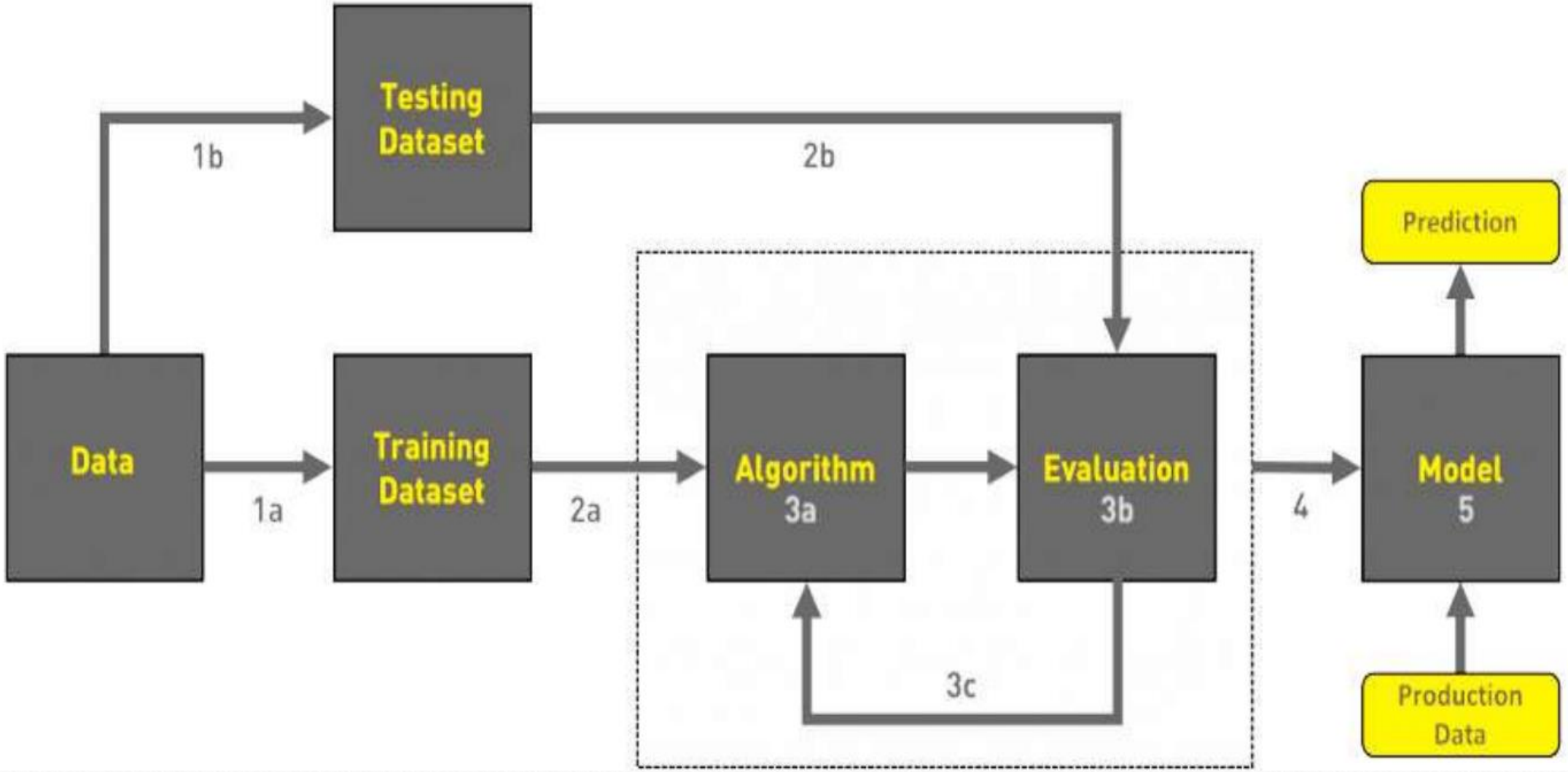
Solution for Fire Prediction System

Dataset is taken from UCI Machine Learning repository, description of dataset is described as below:

- Dataset contains image and video data.
- Image data contains test and train data in image format each havin 3 class i.e., default, smoke, fire.
- Test_default has 84 images, test_fire has 57 images, test_smoke has 30 images.

Contd...

- Train_default has 161 images, train_fire has 274 images, train_smoke has 258 images.
- Video data contains test and train data in video format.
- Test_video contains 3 videos.
- Train_video contains 12 videos consisting of fire with smoke, only fire, only smoke, no fire videos.


Testing Dataset
1b
2b
Prediction
Data
1a
Training Dataset
2a
Algorithm
3a
Evaluation
3b
4
Model
5
3c
Production Data

REQUIREMENTS

HARWARE : - Processor Above : 1.5Ghz

Hardware Disk : 80GB

RAM: 2GB

SOFTWARE : - OS : Windows 7,8, 10

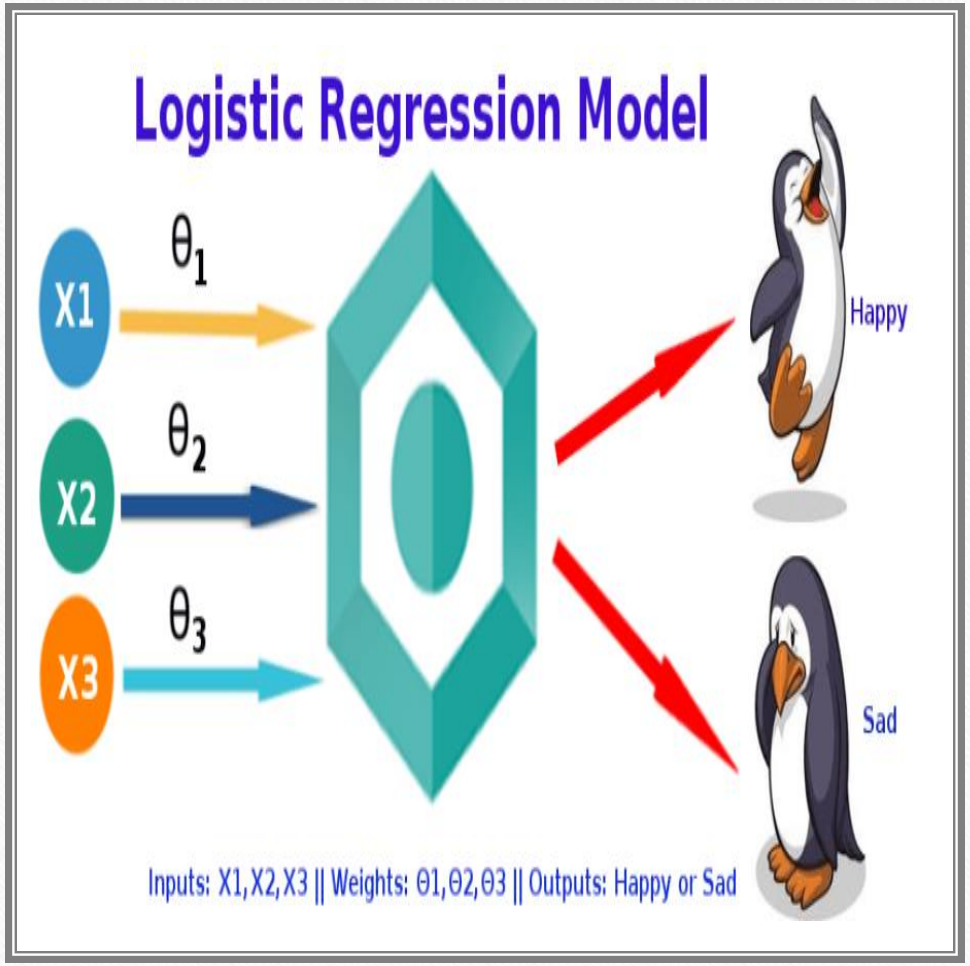
Language : Python

IDE : Jupyter Notebook

ML AlGORITHMS USED

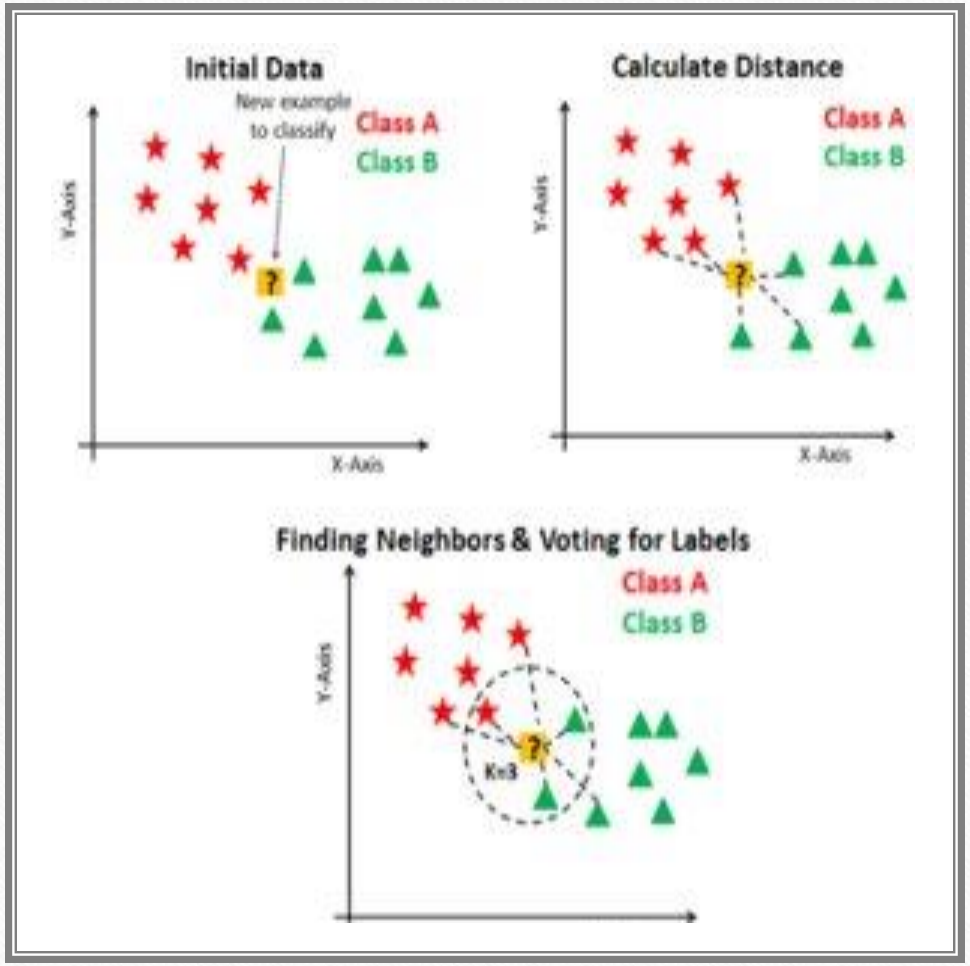
- Decision Tree
- Naive Bayes Classifier
- Logistic Regression
- Feed forward neural network
- Support Vector Machine
- Random Forest

The above six algorithms are used for maintaining accuracy, precision, recall, training & testing.



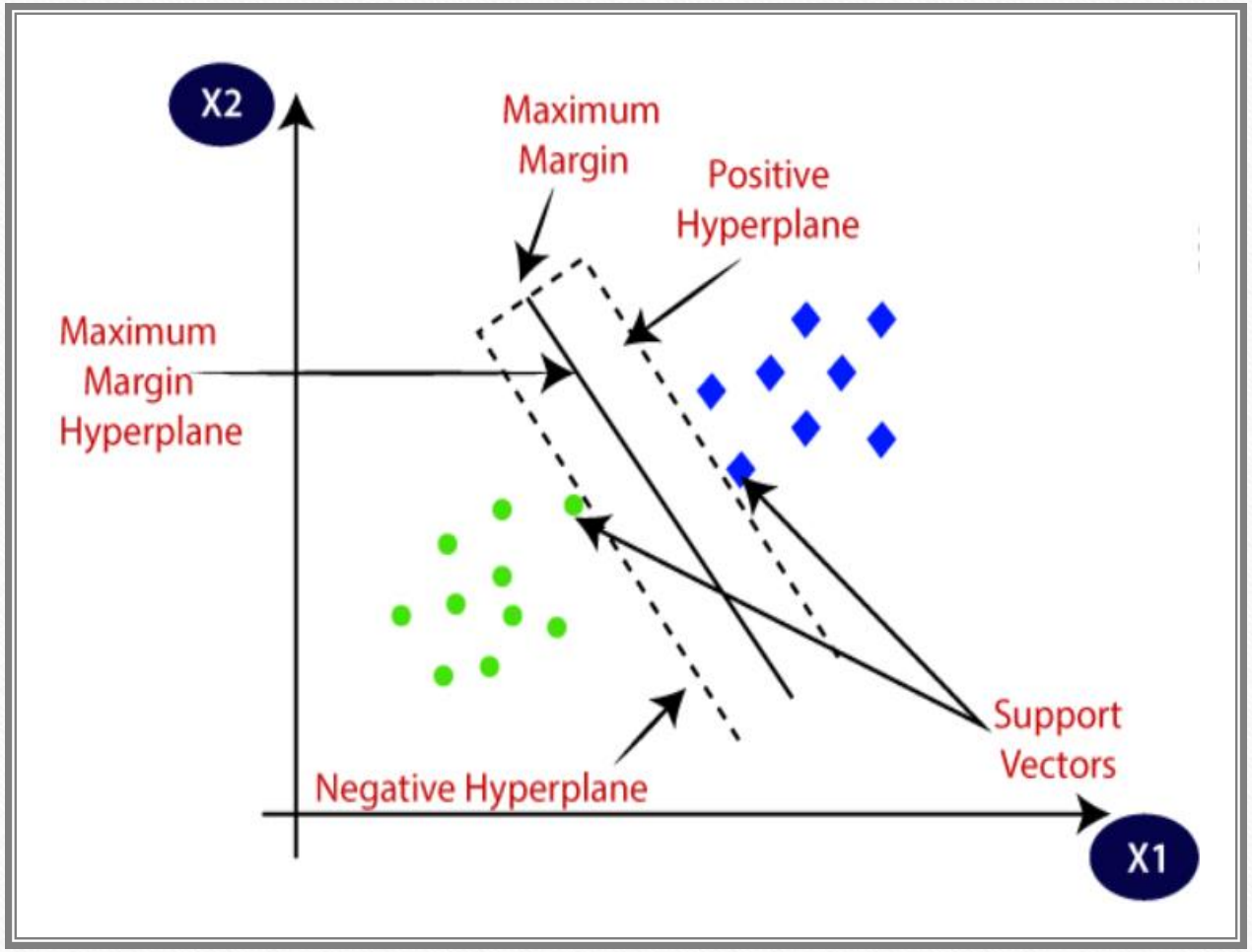
LOGISTIC REGRESSION

- Train the machine using dataset
- Determining accuracy, precision, recall of logistic regression.
- Testing the dataset (providing custom input)



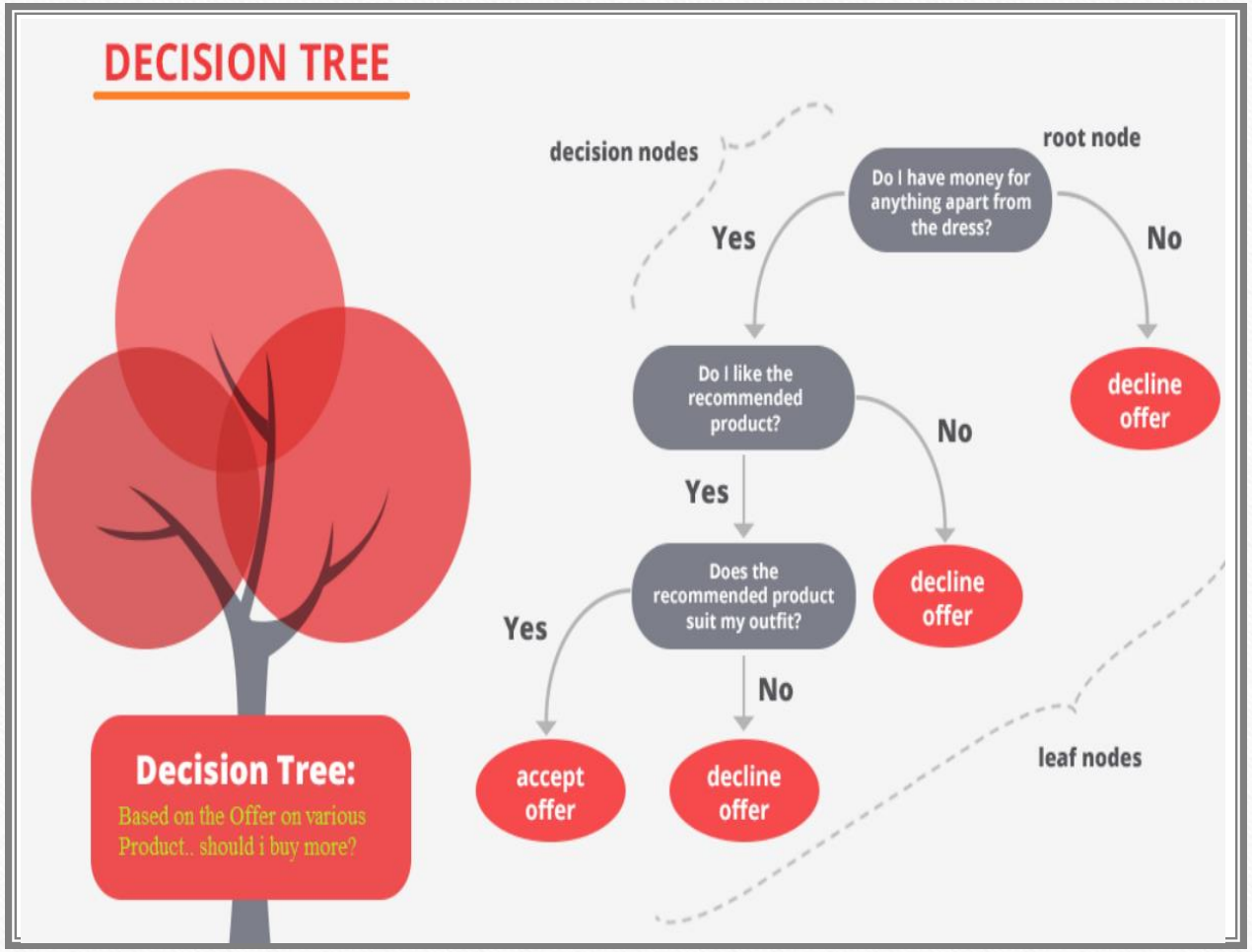
KNN CLASSIFICATION

- Train the machine using dataset
- Determining error rate and k value
- Determining accuracy, precision, recall
- Prediction using the test input.



SUPPORT VECTOR MACHINE

- Fit a SVM model to the dataset
- Train the machine using dataset
- Determining accuracy, precision, recall
- Prediction using the test input.



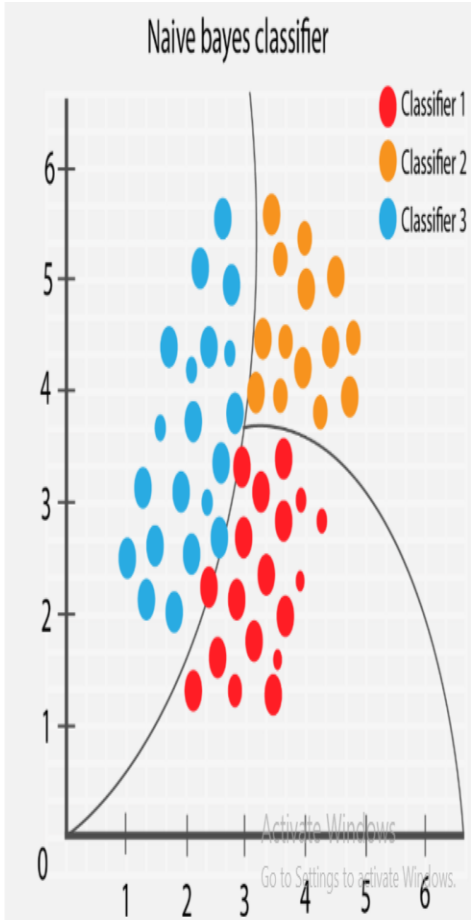
DECISION TREE

- Train the machine using dataset
- Determining accuracy, precision, recall
- Prediction using the test input.

$$P(A|B) = \frac{P(B|A)\,P(A)}{P(B)}$$

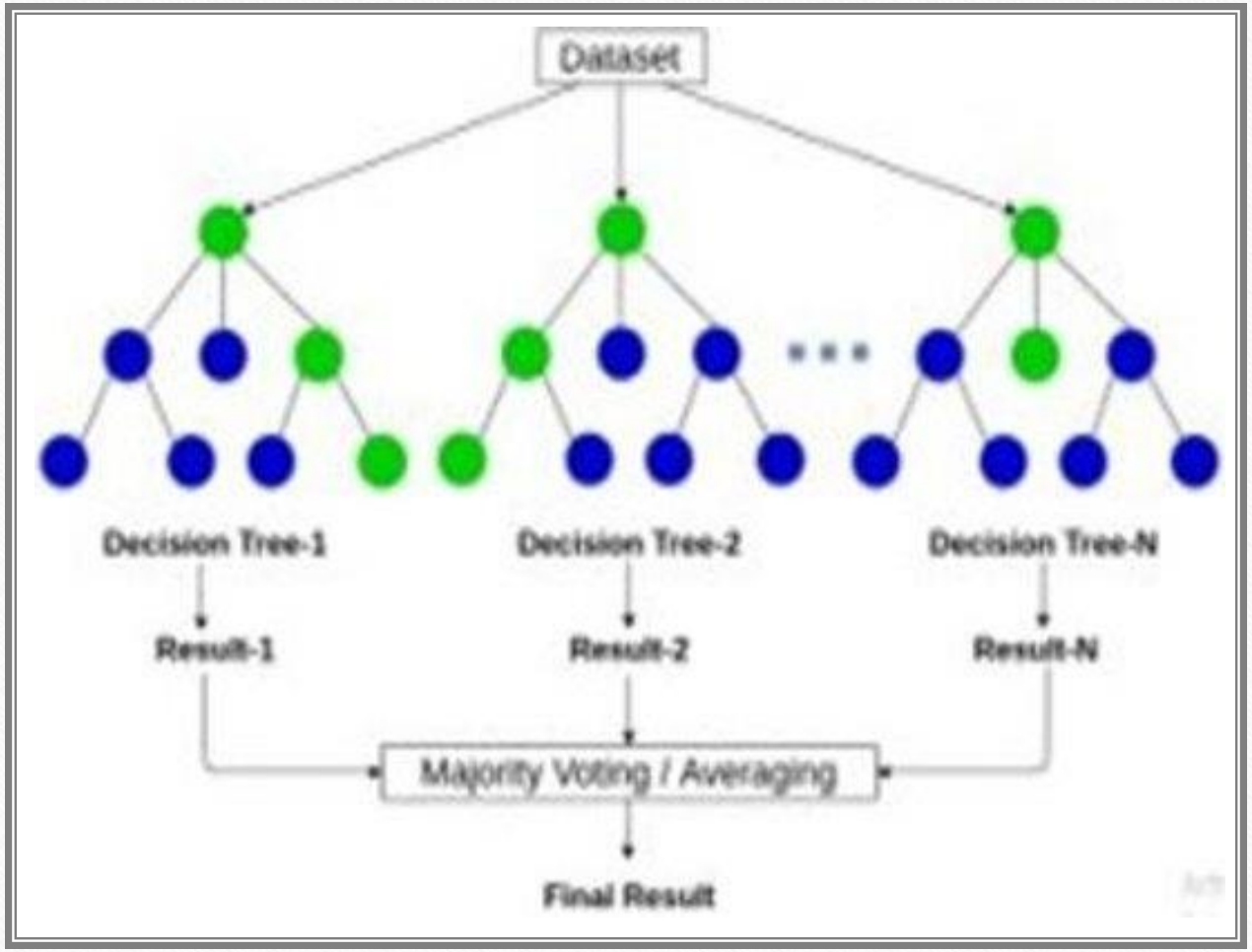
using Bayesian probability terminology, the above equation can be written as

$$\text{Posterior} = \frac{\text{prior} \times \text{likelihood}}{\text{evidence}}$$



NAIVE BAYES

- Fit a Naive Bayes model to the dataset
- Train the machine using dataset
- Determining accuracy, precision, recall
- Prediction using the test input.



RANDOM FOREST

- Fit a random forest model to the dataset
- Train the machine using dataset
- Make predictions
- Determining accuracy, precision, recall
- Prediction using the test input.

RESULTS

Machine Learning Algorithm	Accuracy
Decision Tree	52.56%
Naïve Bayes Classifier	48.07%
Logistic Regression	55.80%
Support Vector Machine	61.50%
K Nearest Neighbour	62.82%

CONCLUSION

- In the case of forest fire detection , **ML algorithms remove the difficulty** faced in traditional methods like man standing on a tower and monitoring the environment.
- All the data in the dataset has to be aggregated to reach the result so it is done by using **tree based and cluster based methods**.
- With the use of machine learning techniques, the **problem of faulty nodes is minimized**.
- With the use of regression algorithm , network lifetime is enhanced and with the use of decision tree algorithm network **lifetime is enhanced** as well as accuracy.
- **SVM and neural network** give **better results**.

FUTURE PLAN

Finding a method based on machine learning which will be

- Accurate in prediction
- Fault Tolerant
- Robust and then finding its space and time complexity
- Will try to optimize it.