DETECTING FIRE COMBUSTION USING IBM WATSON STUDIO

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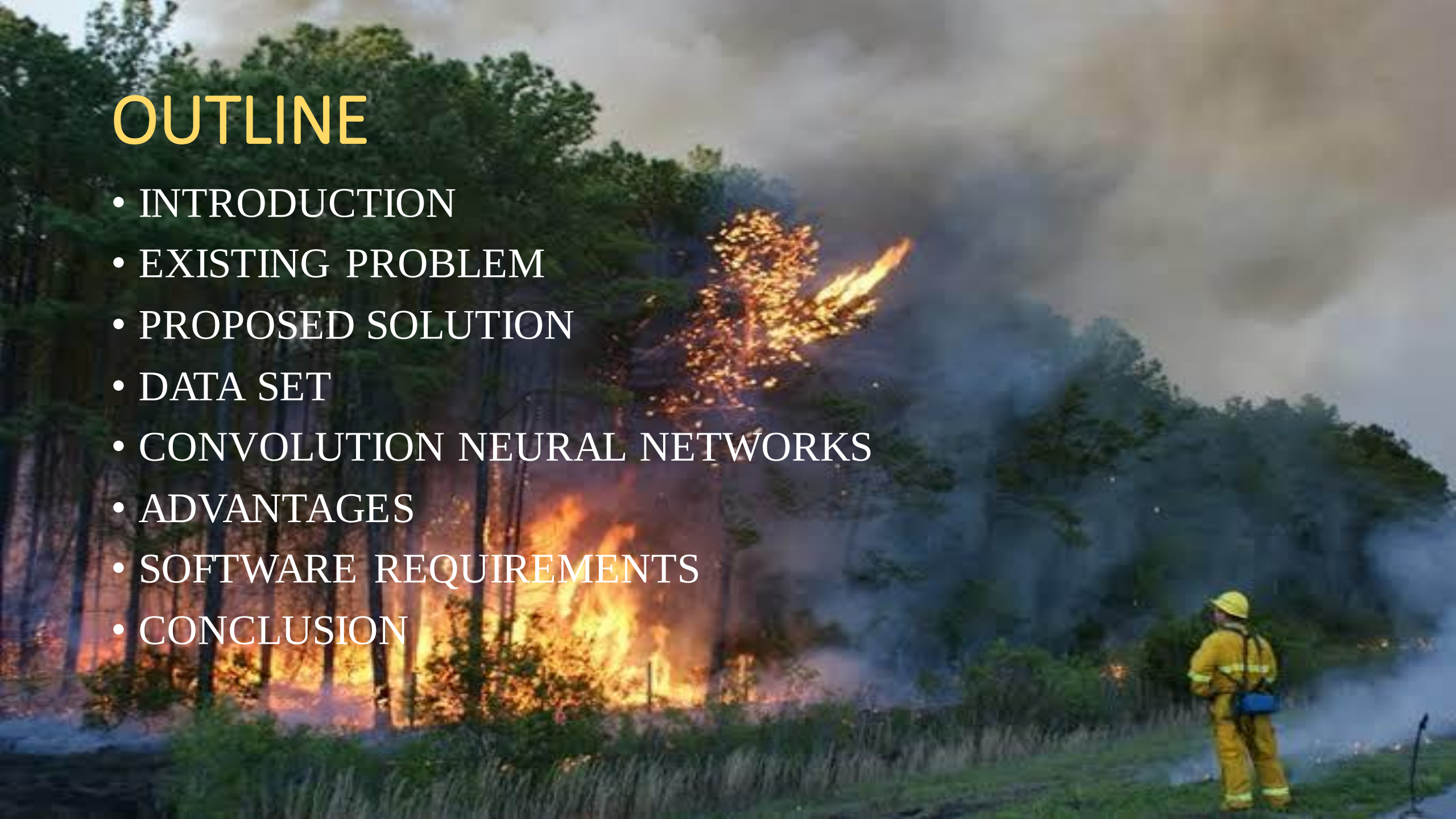

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INTRODUCTION

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.

EXISTING PROBLEM

The problem with forest fires is that the forests are usually remote, abandoned/unmanaged areas filled with trees, dry and parching wood, leaves, and so forth that act as a fuel source. These elements form a highly combustible material and represent the perfect context for initial-fire ignition and act as fuel for later stages of the fire. The fire ignition may be caused through human actions like smoking or barbeque parties or by natural reasons such as high temperature in a hot summer day or a broken glass working as a collective lens focusing the sun light on a small spot for a length of time thus leading to fire-ignition. Once ignition starts, combustible material may easily fuel to feed the fires central spot which then becomes bigger and wider. The initial stage of ignition is normally referred to as “surface fire” stage. This may then lead to feeding on adjoining trees and the fire flame becomes higher and higher, thus becoming “crown fire.” Mostly, at this stage, the fire becomes uncontrollable and damage to the landscape may become excessive and could last for a very long time depending on prevailing weather conditions and the terrain . Millions of hectares of forest are destroyed by fire every year. Areas destroyed by these fires are large and produce more carbon monoxide than the overall automobile traffic. Monitoring of the potential risk areas and an early detection of fire can significantly shorten the reaction time and also reduce the potential damage as well as the cost of fire fighting. Known rules apply here: 1 minute—1 cup of water, 2 minutes—100 litres of water, 10 minutes—1,000 litres of water. The objective is to detect the fire as fast as possible and its exact localization and early notification to the fire units is vital. This is the deficiency that the present Invention attempts to remedy, by means of detection of a forest fire at the very early stage, so as to enhance or ensure the chance to put it out before it has grown beyond control or causes any significant damage.

PROPOSED SOLUTION

Forest Fire Prevention Tips:

The DEEP's Forest Fire Control Office urges all who enjoy the use of Connecticut's parks, forests and open spaces, to use fires with caution and heed the following recommendations especially during forest fire season:

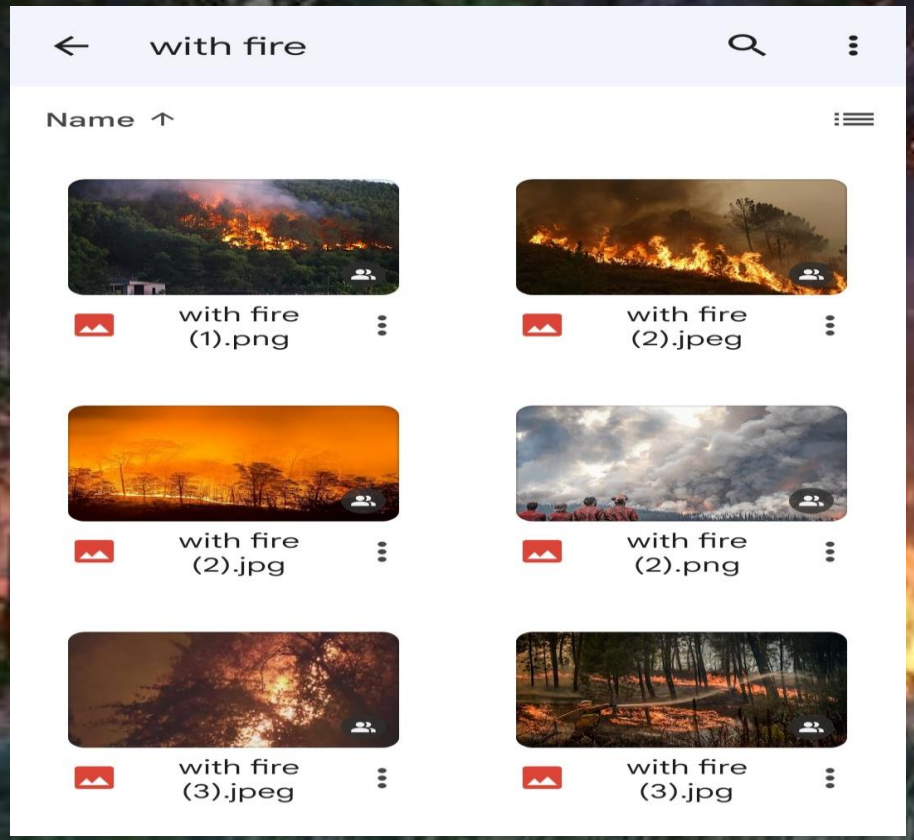
Obey local laws regarding open fires, including campfires;
Keep all flammable objects away from fire;
Have firefighting tools nearby and handy;
Carefully dispose of hot charcoal;
Drown all fires;
Carefully extinguish smoking materials.

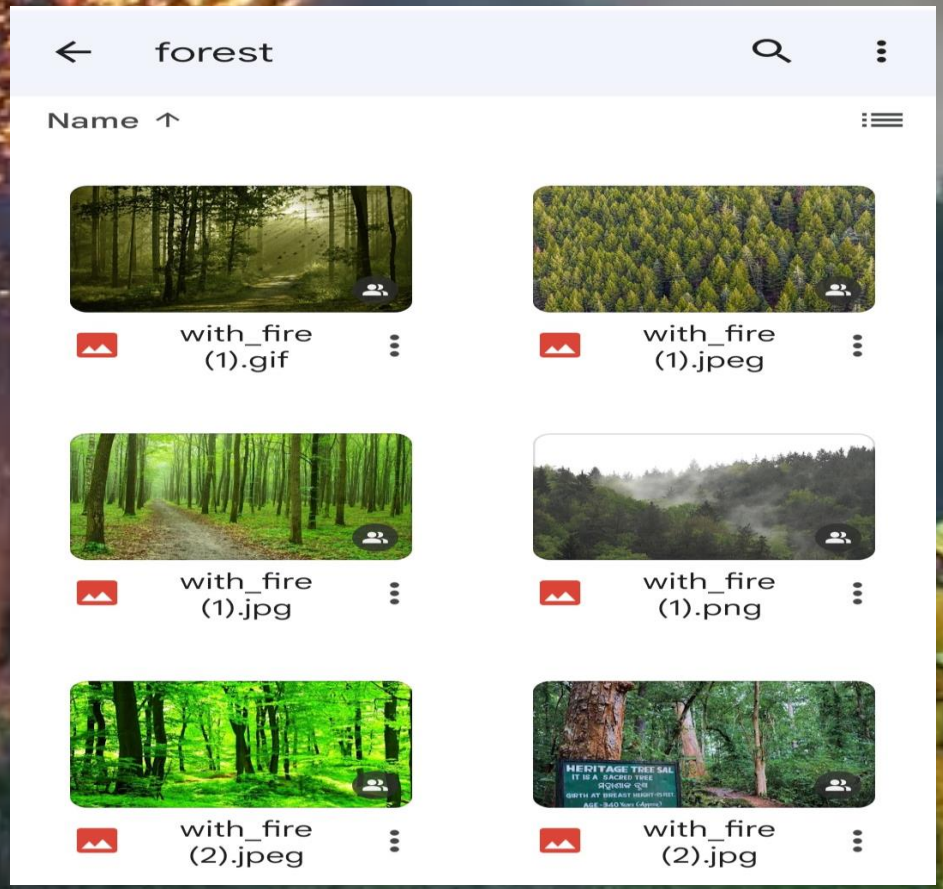
DATA SET

In this project we use training and testing dataset.

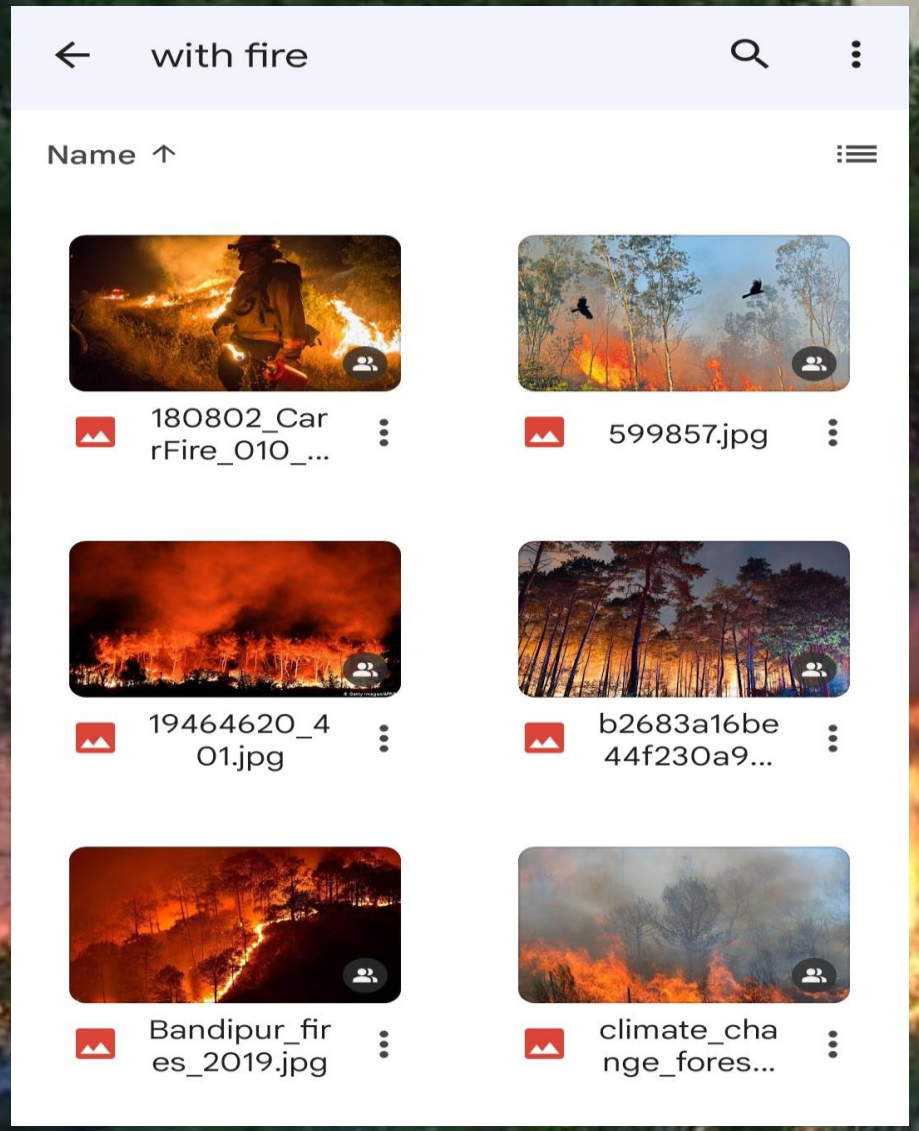
Moreover, to evaluate the model we divided the dataset to 70% for training data, 30% for testing the data.

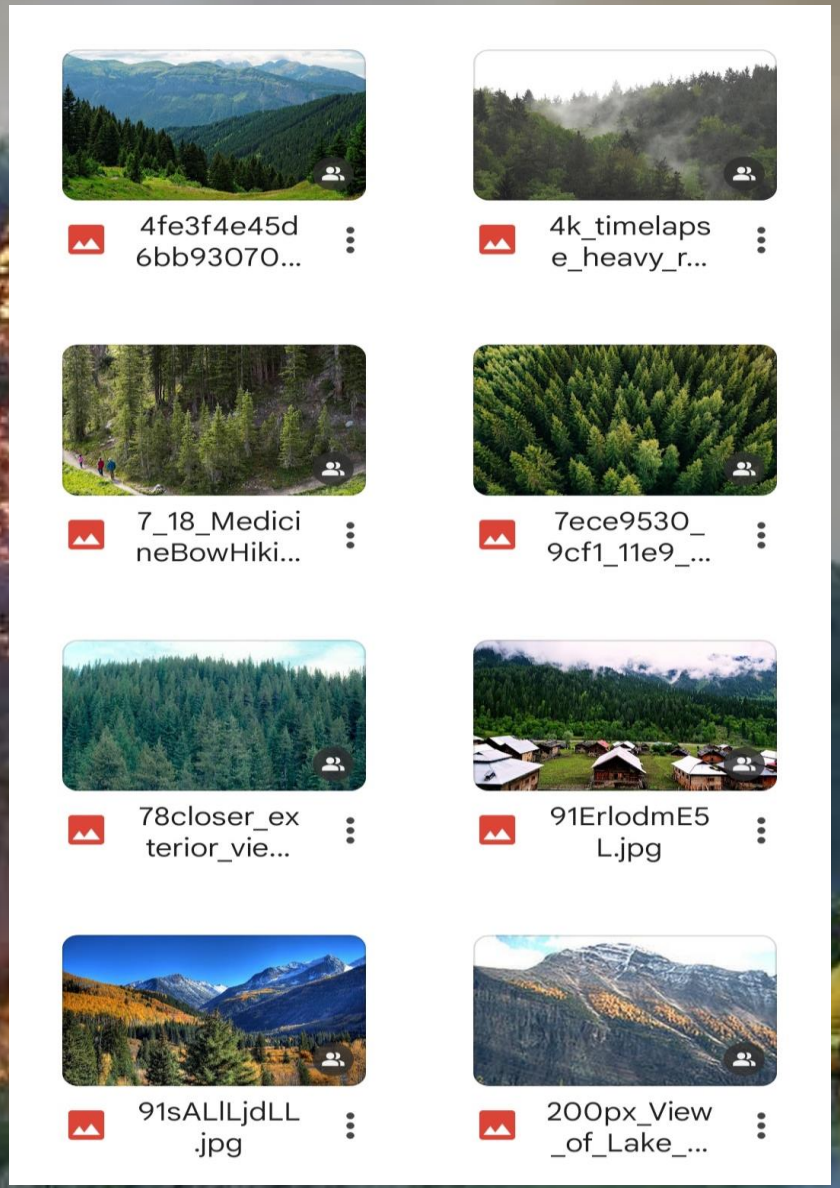
Testing data:





Training data:

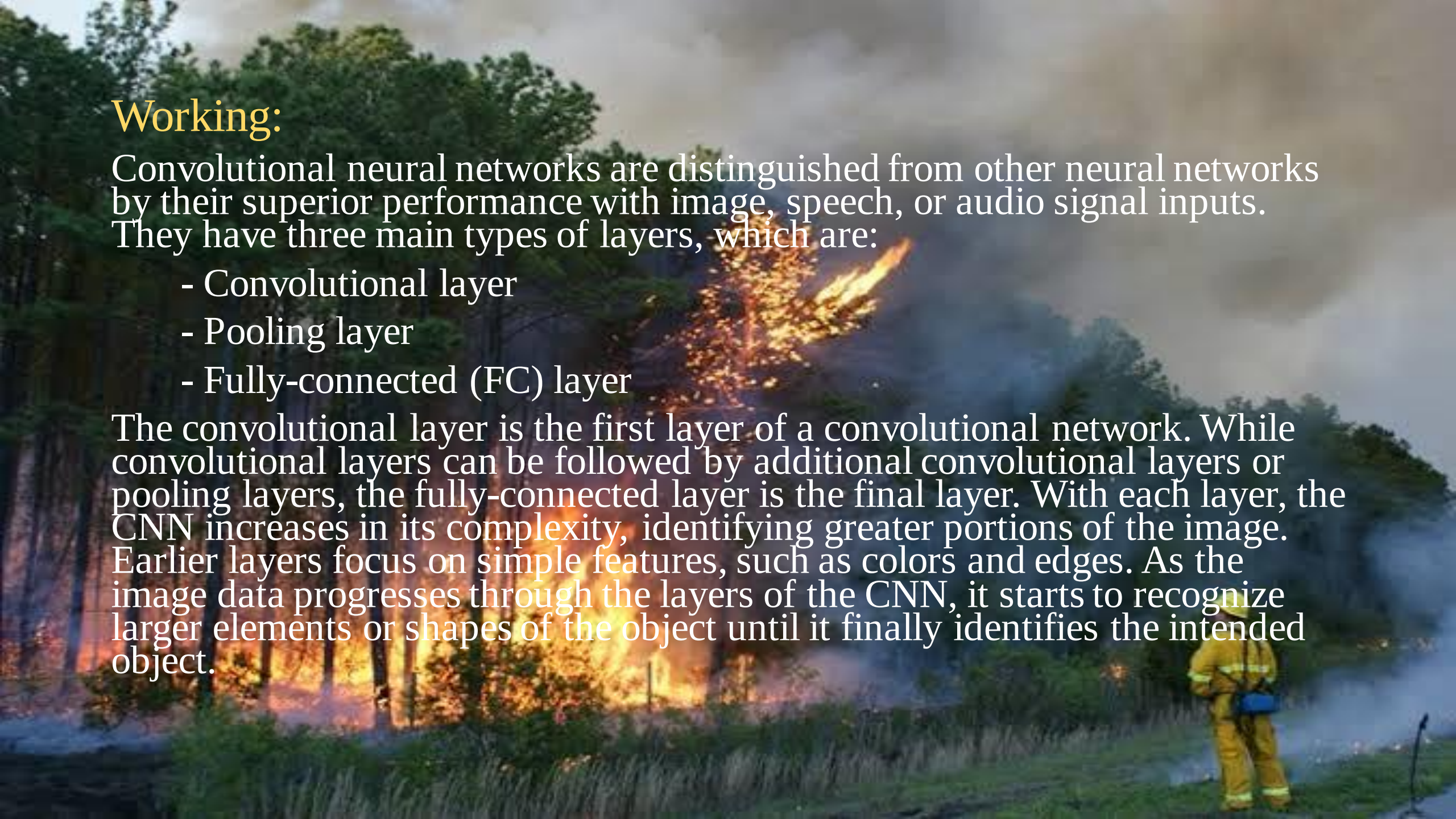




CONVOLUTION NEURAL NETWORKS

Neural networks are a subset of machine learning, and they are at the heart of deep learning algorithms. They are comprised of node layers, containing an input layer, one or more hidden layers, and an output layer. Each node connects to another and has an associated weight and threshold. If the output of any individual node is above the specified threshold value, that node is activated, sending data to the next layer of the network. Otherwise, no data is passed along to the next layer of the network.

convolutional neural networks (ConvNets or CNNs) are more often utilized for classification and computer vision tasks.



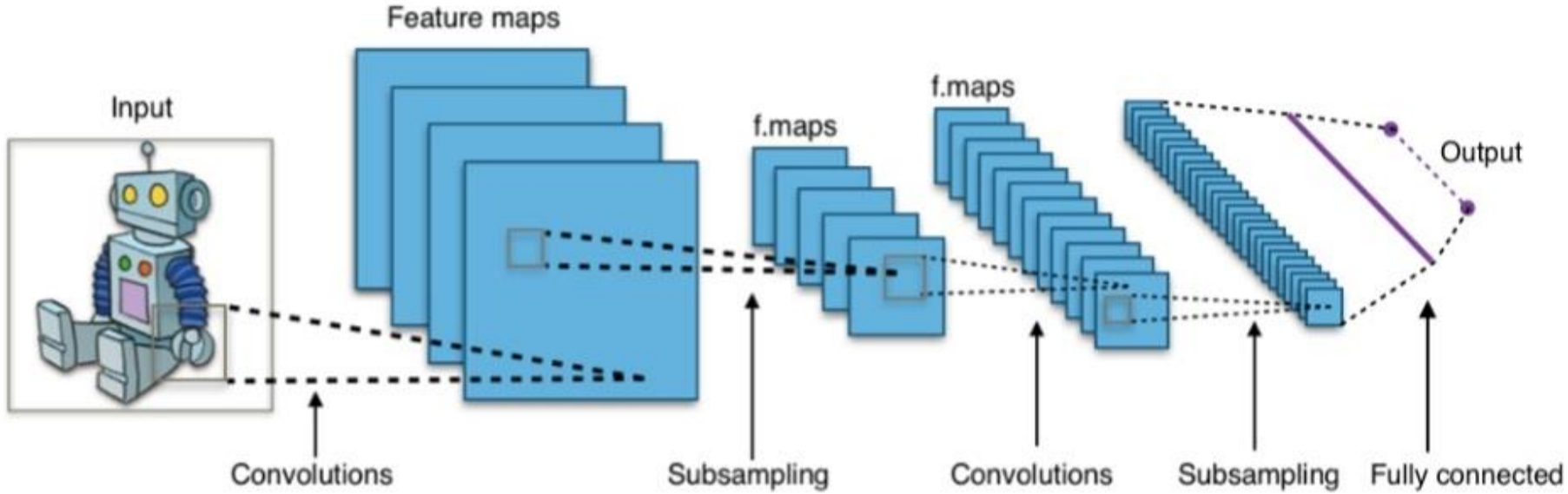
Working:

Convolutional neural networks are distinguished from other neural networks by their superior performance with image, speech, or audio signal inputs. They have three main types of layers, which are:

- Convolutional layer
- Pooling layer
- Fully-connected (FC) layer

The convolutional layer is the first layer of a convolutional network. While convolutional layers can be followed by additional convolutional layers or pooling layers, the fully-connected layer is the final layer. With each layer, the CNN increases in its complexity, identifying greater portions of the image. Earlier layers focus on simple features, such as colors and edges. As the image data progresses through the layers of the CNN, it starts to recognize larger elements or shapes of the object until it finally identifies the intended object.

CONVOLUTION NEURAL NETWORKS



RESULT

ADVANTAGES

- More dynamic and wider detection as compared to fixed sensors.
- Reduction in cost.
- Unreachable areas can now be controlled by MBSs.
- To detect poaching and monitor comprehensive animal deaths.
- Proposed methods are very convenient and can easily detect.

SOFTWARE REQUIREMENTS

- Anaconda Navigator
- Tensorflow
- Keras
- OpenCV

CONCLUSION

- New wireless technologies and new satellite tracking systems can be adapted to increase the efficiency of the system.
- New sensors can be produced or existing sensors can be improved to increase robustness of the proposed system.
- A number of investigations can be made regarding animal behavior in case of fire to improve system reliability.