



## TOMATO LEAF DISEASE DETECTION USING CNN

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### Abstract:

**One of the important and tedious task in agricultural practices is detection of disease on crops. Agriculture provides food to all the human beings even in case of rapid increase in the population. It is recommended to predict the plant diseases at their early stage in the field of agriculture is essential to cater the food to the overall population. But to predict the diseases at the early stage is quite difficulty like of the tomato crop. Here the proposed system gives a detection of tomato crop disease which uses computer vision and deep learning. Overall, the approach is to train deep learning model and then deploy it on web to predict disease on tomato crop.**

**Keywords: Deep learning, Tomato crop diseases**

### Introduction:

India is a country with a majority of the population relying heavily on the agricultural sector. Tomato is the most common vegetable used across India. The three most important antioxidants namely vitamin E, vitamin C and beta-carotene are present in tomatoes. They are also rich in potassium, a very important mineral for good health. Tomato crop cultivation area in India spans around 3, 50,000 hectares approximately and the production quantities roughly sum up to 53, 00,000 tons, making India the third largest tomato producer in the world. The sensitivity of crops coupled with climatic conditions have made diseases common in the tomato crop during all the stages of its growth. Disease affected plants constitute 10-30% of the total crop loss. Identification of such diseases in the plant is very important in preventing any heavy losses in yield as well as the quantity of the agricultural product. Monitoring the plant diseases manually is a

difficult task due to its complex nature and is a time consuming process.

There is a need to reduce the manual effort put into this task, while making accurate predictions and ensuring that the farmers' lives are hassle free. Visually observable patterns are difficult to decipher at a single glance, leading to many farmers making inaccurate assumptions regarding the disease. As a result, prevention mechanisms taken by the farmers may be ineffective and sometimes harmful. Farmers usually come together and Dept. of Information Science and Engg. Siddaganga Institute of Technology, Tumkur implement common disease prevention mechanisms, as they lack expert advice on how to deal with their crop infestation. There has been circumstances where due to inadequate knowledge or misinterpretation regarding the intensity of the disease, over-dosage or under-dosage of the pesticide has resulted in crop damage. This is the underlying motivation for the proposed methodology that aims to accurately detect and classify diseases in the tomato crop.

### Literature Survey:

Plant leaf disease detection has been a major research area in which both image processing and deep learning techniques have been widely used for its accurate classification. Monitoring a large field of crops is a tedious task, if done manually. It is necessary to minimize the human effort put into plant supervision. Hence this is a popular research domain attracting many researchers. Several works related to plant diseases are observed in literature. The most popularly incorporated techniques in literature in the relevant field. Making use of analysis and detection processes using present technology helps the farmers to get rid of such problems. The use of

technologies like Computer vision and Machine Learning (ML) helps to fight against diseases. In this paper, we are using ML to give a solution to Plant Diseases. In this method, we

have divided the process into three stages. To design an accurate and robust tomato plant leaf disease classification model.

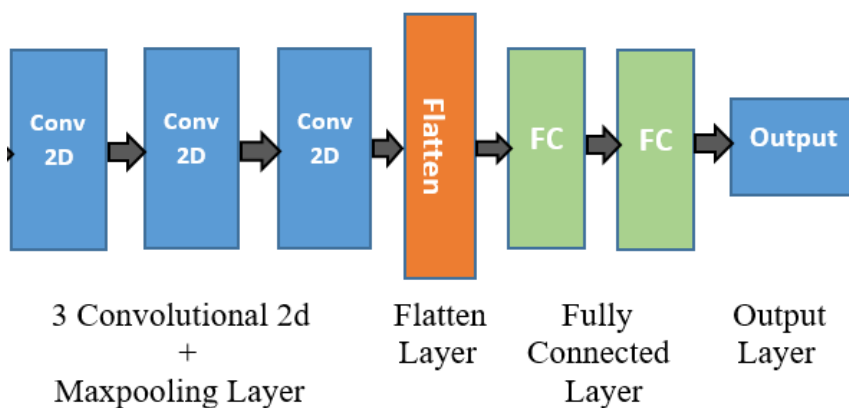
Sr. no.	Journal Name And Publication year	Name	Title
1	International Conference On internet of Things and Intelligence System Analysis[IEEE][2018]	Sachin D Khirade	Identification of plant disease is the key to preventing the losses in the yield and quantity of agricultural product.
2	International Conference for Convergence in Technology(EEE) [2018]	M.MalathiK. Aruli	They provide survey on plant leaf disease detection using image processing techniques.
3	International Research Journal of Engineering andTechnology[IEEE] [2018]	Y.SanjanaAs hwanathSiva samy	In this it describes the uploaded picture captured by the mobile phones and presented to an expert group for their opinion

**Proposed Methodology:**

The proposed methodology consists of three major steps:

- a. data acquisition
- b. pre- processing
- c. classification.
  1. We proposed a CNN based model that was built on image dataset downloaded from Kaggle. The total image classes are divided into training and testing dataset.
  2. To build the training model, training and validation batches are generated with the dataset image size 128x128 and batch size as 32 to speed up the training process.

3. Here, we proposed a tomato leaf disease prediction system that used convolutional neural network architecture with fully connected layers in order to extract the features then classify the extracted features based classifier.
4. We are creating blocks using Conv2D layer, Max-Pooling2D, Dropout, Flatten, and then stacking them together and at the end-use Dense Layer for output.CNN model architecture as below:



**Conclusion:**

Agricultural sector is still one of the most important sector over which the majority of the Indian population relies on. Detection of diseases in these crops is hence critical to the growth of the economy.

The proposed methodology in the following tomato plant leaf disease detection and identification of 10 different diseases in the tomato crop using CNN. The proposed methodology system focus on generating an advance and efficient system which makes the process of creating high yield of tomato much more easier for the farmers.

Tomato is one of the staple crops which is produced in large quantities. It can provide the help for a person having less knowledge about the diseases, depending on their goals, we have extract the features corresponding to diseases

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