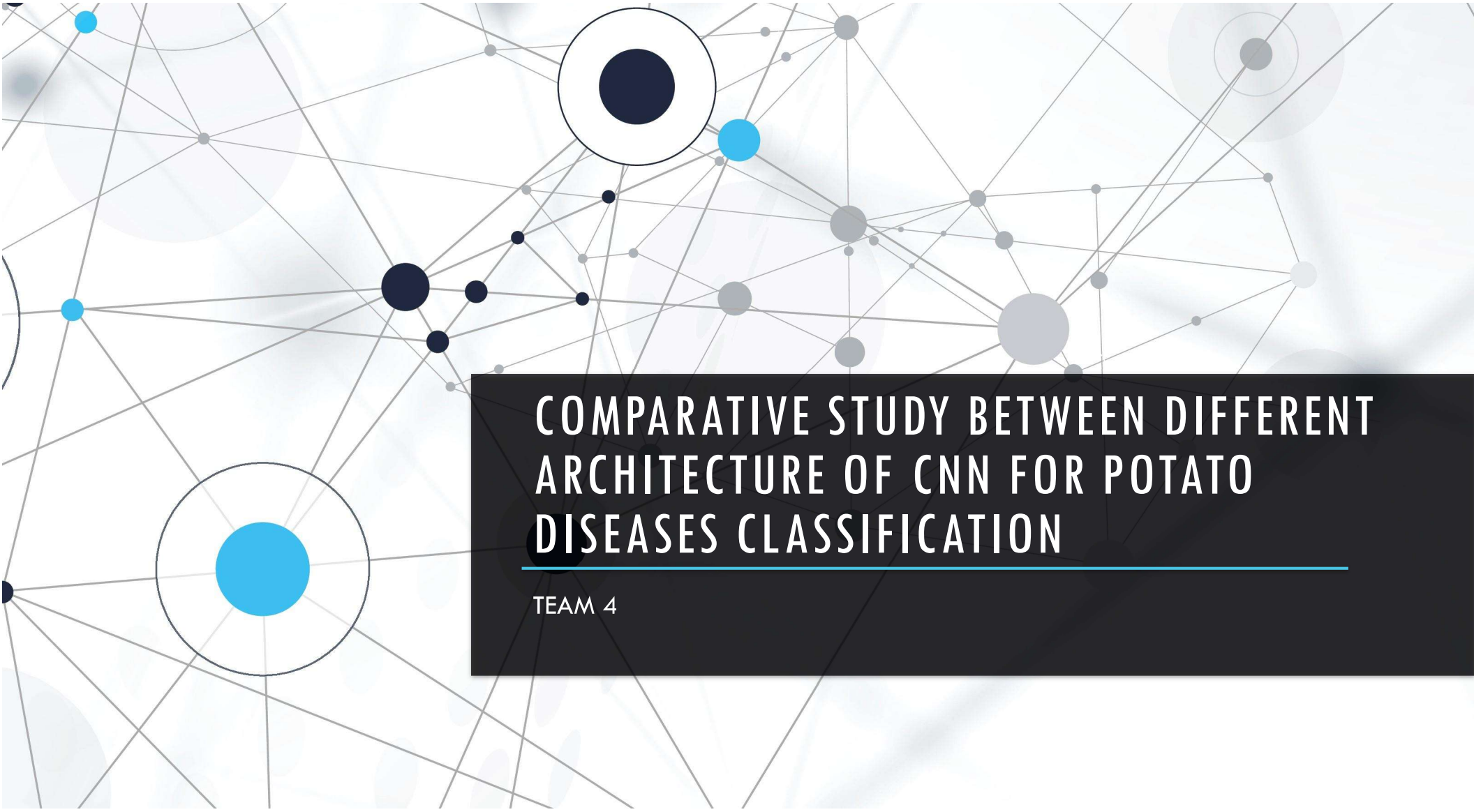

COMPARATIVE STUDY BETWEEN DIFFERENT ARCHITECTURE OF CNN FOR POTATO DISEASES CLASSIFICATION

TEAM 4

PROBLEM STATEMENT

We are trying to develop deep learning model to identify the disease in potato crop after analyzing the images of leaves.

We will perform a comparative study between 2 different architecture of CNN and compare which of architecture outperform with respect to accuracy parameter

In the context of potato disease prediction, a CNN could be trained on a large dataset of potato leaves images, both healthy and diseased, to learn the characteristics of each type of disease. The CNN would learn to identify common features in the images, such as discoloration, spot patterns, or wilting, that are indicative of certain diseases.

REAL LIFE IMPACT

Potato is one of the most widely cultivated and consumed vegetables in the world. However, various diseases can significantly affect the yield and quality of the potato crop. The timely identification of the diseases is crucial for the efficient management of the Potato production. Currently, the identification of potato diseases is often performed manually by experts, which is time-consuming and prone to errors.

This work will solve farmers problems of plant's disease identification without running after plant scientists.

It will thus help them cure the plant's disease in timely fashion and will thus increase both quality and quantity of food crops produce and therefore help in increasing farmer's profit.

REAL LIFE IMPLICATIONS

Punjab: Late blight disease symptoms in potato crop, PAU issues advisory

A Punjab Agricultural University spokesperson said symptoms of the disease have been in fields across Hoshiarpur, Gurdaspur, and Ropar, and the most probable reason for this is intermittent rain, which has created favourable weather for late blight growth.

By: Express News Service
Ludhiana | Updated: December 17, 2019 17:12 IST

NewsGuard

Late blight attack has potato growers worried in Ambala

Cases of fungal infection reported from Jawahargarh, Halderi villages

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Updated At: Dec 25, 2019 08:03 AM (IST)

797

Plant peril: Much like Covid-19 pandemic, an outbreak of diseases among plants is also real

Plant pathogens usually do not infect humans directly, and the harm is generally in the form of food insecurity.

Written by Shubhangi Shah

January 22, 2023 01:30 IST

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News › India

Potato disease: Late blight attack worries growers; state govt sends team to 3 districts

By Oneindia Staff Correspondent | Published: Wednesday, January 22, 2020, 11:05 [IST]

14

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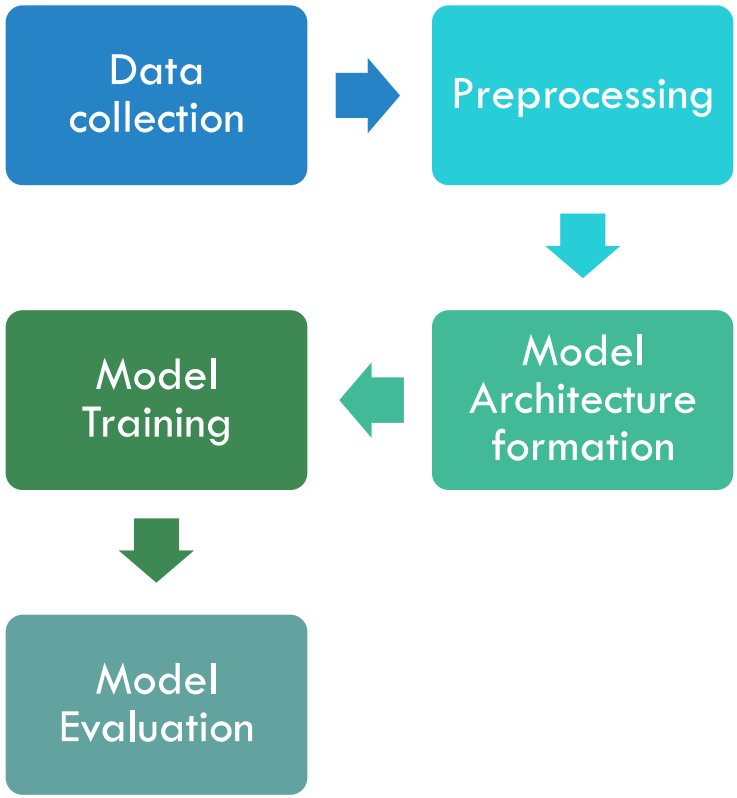
STEPS INVOLVED IN BUILDING A CNN MODEL FOR DISEASE DETECTION

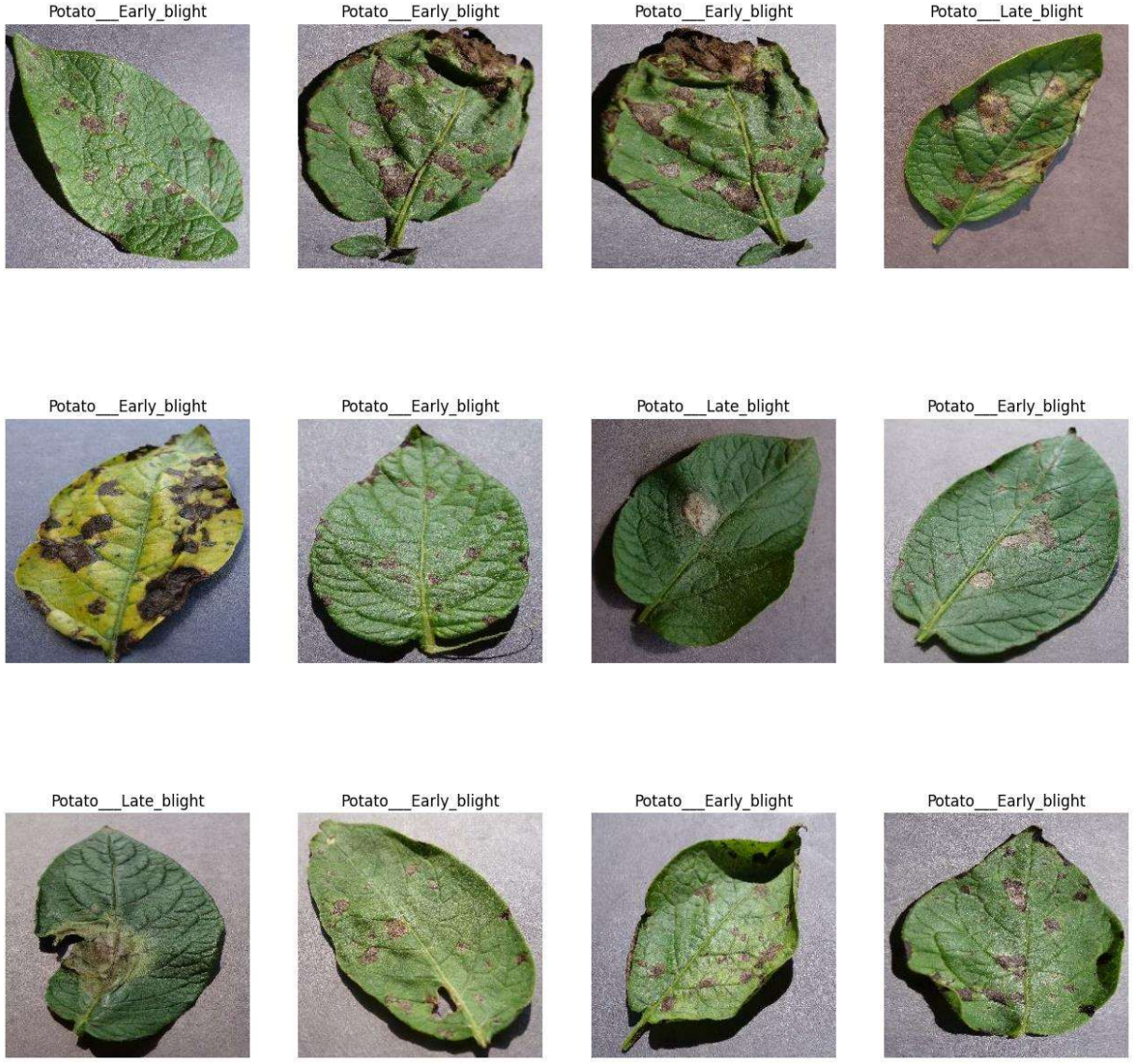
1. Data Collection
2. Pre processing
3. Model Architecture : AlexNet and VGG16
4. Model training
5. Model evaluation



2152

DATASET EXPLANATION

1. Source of dataset : https://drive.google.com/file/d/1_dbGiffY_Q3-0mqSxn__yBFCfCHOk6P3/view?usp=sharing
2. Total 2152 images belonging to 3 classes
3. Classes: Potato early blight , Potato late blight , Potato healthy.
4. Early blight : is **a disease of potato caused by the fungus Alternaria solani.** It is found wherever potatoes are grown. The disease primarily affects leaves and stems, but under favorable weather conditions, and if left uncontrolled, can result in considerable defoliation and enhance the chance for tuber infection.
5. Late blight : **disease of potato and tomato plants that is caused by the water mold Phytophthora infestans.** The disease occurs in humid regions with temperatures ranging between 4 and 29 °C (40 and 80 °F). Hot dry weather checks its spread.


Potato___Early_blight
Potato___Early_blight
Potato___Early_blight
Potato___Late_blight
Potato___Early_blight
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Potato___Early_blight

HISTORY OF DEEP LEARNING

Deep learning is a subfield of machine learning that has its roots in artificial neural networks, which have been around since the 1940s. However, it wasn't until the late 2000s and early 2010s that deep learning began to have a major impact on the field of artificial intelligence.

One of the key factors that led to the resurgence of deep learning was the availability of large amounts of data and computing power. This made it possible to train deep neural networks, which are composed of many layers of interconnected nodes, on a massive scale.

HISTORY OF DEEP LEARNING

Another important factor was the development of new algorithms and techniques for training deep neural networks, such as convolutional neural networks (CNNs) for image recognition and recurrent neural networks (RNNs) for natural language processing. These innovations made it possible to achieve state-of-the-art results on a wide range of tasks, including object recognition, speech recognition, and machine translation.

As the performance of deep learning models continued to improve, they were increasingly adopted by industry, leading to a number of high-profile applications such as self-driving cars, virtual personal assistants, and image and speech-based search engines.

TIMELINE OF DEEP LEARNING

Here is a brief timeline of some of the key events in the history of deep learning:

1943: Warren McCulloch and Walter Pitts propose the first mathematical model of an artificial neuron, known as a McCulloch-Pitts neuron.

1949: Donald Hebb proposes that connections between neurons can be strengthened through repetition, a concept now known as Hebbian learning.

1957: Frank Rosenblatt introduces the perceptron, a simple model of a neural network that can learn linear separations.

1969: Marvin Minsky and Seymour Papert publish the book "Perceptrons," which argues that single-layer neural networks are limited in their ability to learn complex functions.

TIMELINE OF DEEP LEARNING

1986: Geoffrey Hinton, David Rumelhart, and Ronald Williams publish the backpropagation algorithm, a method for training multi-layer neural networks.

1997: The first Convolutional Neural Network (CNN) is introduced for image recognition.

2012: Alex Krizhevsky, Ilya Sutskever, and Geoffrey Hinton develop a deep convolutional neural network (DCNN) that wins the ImageNet Large Scale Visual Recognition Challenge (ILSVRC) competition.

2015: Google develops the first deep neural network capable of end-to-end speech recognition.

2016: AlphaGo, a deep reinforcement learning algorithm developed by DeepMind, beats world champion Lee Sedol at the game of Go.

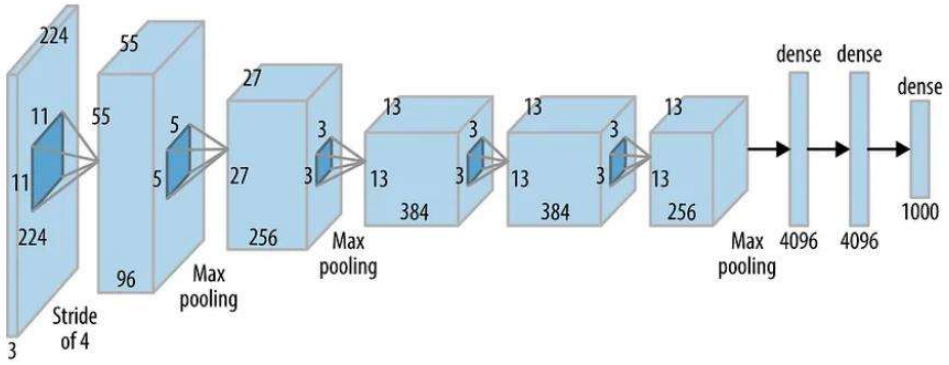
2017: A DCNN developed by OpenAI surpasses human performance on the SuperGLUE benchmark for natural language understanding.

2018: Google develops a deep learning system that can generate human-like speech.

ARCHITECTURE OF CNN FOR COMPARATIVE STUDY

AlexNet

Its name comes from one of the leading authors of the AlexNet paper– Alex Krizhevsky. The most important features of the AlexNet paper are:As the model had to train *60 million* parameters (which is quite a lot), it was prone to overfitting. According to the paper, the usage of Dropout and Data Augmentation significantly helped in reducing overfitting. Another distinct factor was using the ReLU activation function instead of tanh or sigmoid, which resulted in faster training times



ARCHITECTURE OF CNN FOR COMPARATIVE STUDY

VGG16

A convolutional neural network is also known as a ConvNet, which is a kind of artificial neural network. A convolutional neural network has an input layer, an output layer, and various hidden layers. VGG16 is a type of CNN (Convolutional Neural Network) that is considered to be one of the best computer vision models to date.