

## Assignment No. 1

- ① Title :- Linear Regression by using Deep Neural Network : Implement Boston housing price prediction problem by linear regression using Deep Neural Network. Use Boston House price prediction dataset.
- ② Aim :- To implement Boston Housing Price Prediction Using Linear Regression.

③ Theory :-  
Here we are going to implementing a Scalable model for predicting the house price prediction using some of the regression techniques based on some of features in the dataset which is called Boston House price prediction.

Housing prices are an important reflection of the economy, and housing price ranges are of great interest for both buyers and sellers. Ask a home buyer to describe their dream houses and they probably won't begin with the height of the basement ceiling or the proximity to an east-west railroad. But this playground competition's data-set proves that much more influences price negotiations than the number of bedrooms or a white-picket fence.

## \* About the Dataset :-

Housing prices are an important reflection of the economy, and housing price ranges are of great interest to both buyers and sellers. In this project house prices will be predicted given explanatory variables that cover many aspects of residential houses. The goal of this project is to create a regression model that is able to accurately estimate the price of the house given the features.

The major aim of this project is to predict the house prices based on the features using some of the regression techniques and algorithms.

## \* Linear Regression :-

It's a Supervised Learning algorithm which is to predict continuous numerical values based on given data input from the geometrical perspective, each data sample is a point. Linear Regression tries to find parameters of the linear functions other distance between the all the point instead the line is as small as possible. Algorithm used for

parameters update is called Gradient Descent.

As a running Example, suppose that we wish to estimate the price of houses (in dollars) based on their area (in square feet) and age (in years) on data consisting of sales including the sales price, area, and age for each home. In the terminologies of machine learning, the dataset is called a training dataset or training set and each row (containing the data corresponding to one sale) is called an example point, in short, sample). The thing we are trying to predict (price) is called label.

The variables (age and area) upon which the predictions are based are called features (or covariants).

\* Machine Learning packages are used for this assignment :-

① Data collection :-

This dataset consists several features such as Number of Rooms, Crime Rate and Tax and so on. Lets know about how to read the dataset into the Jupyter Notebook. You can download

the dataset from Kaggle in csv file format.

## ② Data Preprocessing :-

In this Boston dataset ~~but~~ we need not to clean the data. The dataset already is cleaned when we download from the kaggle. For your satisfaction I will show the number of null or missing values in the dataset. As well as we need to understand shape of the dataset.

## ③ Exploratory Data Analysis :-

In statistics, exploratory data analysis (EDA) is an approach to analyzing datasets to summarize their main characteristics, often with visual methods. A statistical model can be used or not, but primarily EDA is for seeing what the data can tell us beyond the formal modelling or postestig task.

### ④ Feature Selection :-

It is the process where you automatically or manually select those features which contribute most to your prediction variable or output in which you are interested in. Having irrelevant features in your data can decrease the accuracy of the models and make your model learn based on irrelevant features.

### ⑤ Conclusion :-

And thus we have successfully implemented model using Linear Regression.

## Assignment No. 2

- ① Title : Binary classification Using Deep Neural Networks . Example : classify movie reviews . Use IMDB dataset
- ② Aim : To implement movie reviews oposite "positive" reviews and "negative" reviews , just based on the text content of the reviews .
- ③ Theory :

Binary classification refers to classify samples in one of two categories. We will design neural network to perform two-classification of binary classification, of reviews from the movie IMDB movies reviews dataset, to determine whether the reviews are positive or negative. We will use the python library keras.

### ④ The IMDB Dataset

The IMDB dataset is a set of 50,000 highly polarized reviews from the Internet movie dataset. They are split into 25000 reviews each for training and testing. Each set contains an equal number (50%) of positive and negative reviews.

The IMDB dataset comes packaged with reviews. It consists of reviews and their corresponding labels (0 for negative and 1 for positive review). These reviews are given as text boards. They are preprocessed as sequences of integers, where each integer stands for a specific word in the dictionary.

The IMDB dataset can be loaded directly from keras and will usually download about 80 MB on your machine.

### ① Loading the Data :-

Let's load the packaged data from keras. We will only include 10,000 of the most frequently occurring words.

### ② Preparing Data :-

We can not feed a list of integers into our deep neural network. We will need to convert them to tensors.

To prepare our data we will one-hot encode lists and then the convert them into vectors of 0's and 1's.

This would blow up all of our sequences into 10,000-dimensional vectors containing 1 at all indices corresponding to integers present in that sequence. This vector

will have element 0 at a index, which is not present in the sequence.

Simply put the 10,000 - dimensional vector corresponding to each review will have

- Every index corresponding to word
- Every index with value 1 is word that is in the review denoted by its integer counter part
- Every index containing 0 is a word not representing these review.

we will vectorize our data manually for maximum clarity. This will result in a tensor of shape (25000, 10000).

### ④ Model Architecture we will use.

① Two intermediate layers with 16 hidden units each.

② Third layer that will put the sentiment prediction.

③ Intermediate layers will use the ReLU activation function. ReLU or Rectified Linear Unit function will zero out the

negative values.

4) Sigmoid activation for the final layer output layer. A sigmoid function "squashes" arbitrary values into the  $[0, 1]$  range.

#### ④ compiling the model:

In this step, we will choose an optimizer, a loss function, and metrics to observe, we will go forward with.

- binary-cross entropy loss function, commonly used for Binary Classification.

- tensorflow optimizers and accuracy as a measure of performance.

We can pass our choices for optimizer, loss function and metrics as arguments to the compile function because tensorflow, binary-cross entropy and accuracy come packaged with keras.

#### ⑤ conclusion :

And thus we have successfully classified reviews on IMDB.

### Assignment No. 3

- ① Title: convolutional neural Network (CNN). Use any dataset of plant disease and design a plant disease detection system using CNN.
- ② Aims: To implement plant diseases and designed an plant diseases detection system using CNN

#### ③ Theory &

Agricultural production is a very old means of obtaining food. It is a vital source of income for people all around the world. No one can exist in the world without food. Plants are crucial not only for humans but also for animals who rely on them for food, oxygen, and other necessities. The government and experts are taking significant initiatives to enhance food production, and they are working successfully in the field. When a plant becomes affected with a disease, all living organisms in the environment are affected in some way. This plant becomes can affect anywhere on the planet, including the stem, leaf, and branch. Even the types of illnesses that impacts the crops will be determined by factors such as climate. There are large numbers

of people that are born in society.  
This occurs as a result of insufficient food supply.

The goal of Study of Leaf Disease classification using Artificial Neural Networks is to acquire and analyse data from leaf photos in order to determine healthy or diseased leaves of medical plants using image processing methods.

To extract pictures and get data, and algorithm of adjustment constant, segmentation, and features extraction is employed from the image processing approach. The Artificial Neural Network is used to analyse the findings of the experiment.

The architecture of the network used to classify healthy or unhealthy leaves is multi-layered feed-forward Neural Networks, which are multilayer perceptron and radial basis function RBF. The end outcome of the experiment demonstrates that the RBF Network outperforms the MLP Network. At present, the conventional technique of visual inspection in humans by visual inspection makes it impossible to characterize plant disease. Advances in computer vision models

obtaining trust, normalized, and accurate answers to these problems. Classifiers can also be sent as attachments during preparation.

## CNN's

A convolutional Neural Network (CNN) is a deep-learning algorithm that can take in an input image, assign importance (learnable weights and bias) to various aspects / objects in the image, and be able to differentiate one from the other. The pre-processing required in a CNN is much lower compared to other classification algorithms. While in primitive methods filters are hand-engineered with enough training, convnet share the ability to learn these filters / characteristics. The objective of the convolution operation is to extract the high-level features such as edges, from the input image. ConvNets need not be limited to only one convolutional layer. Convolutionally, the first convlayer is responsible for capturing the low-level features such as edges, color, gradient orientation etc.

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 :-

- ① Convolutional Layer
- ② Pooling Layer
- ③ Fully-connected (FC) Layer

Let's take an example by running a convnet on an image of dimension  $32 \times 32 \times 3$ .

- 1) Input Layer : This layer holds the raw input of the image with width 32, height 32 and depth 3.
- 2) Convolution Layer : This layer computes the output volume by computing the dot product between all filters and image patches. Suppose we use a total of 12 filters for this layer, we will get output volume of dimension  $32 \times 32 \times 12$ .
- 3) Activation function Layer : This layer will apply an element-wise activation

function to the output of the convolutional layer. Some recommendation will apply.

The volume remains unchanged hence output volume will have dimension  $32 \times 32 \times 12$ .

4) Pool Layer : This layer is periodically inserted in the convnets and its main function is to reduce the size of volume which makes the computation fast reduces memory and prevents over fitting. Two common types of poolings layers are max pooling and average pooling.

#### \* Advantages:-

- ① Very High accuracy in image cognition problem.
- ② Automatically detects the important features with out any human supervision.
- ③ weight sharing.

#### \* Disadvantages:-

- ① CNN do not encode the position and orientation of object.
- ② Lack of ability to be spatially invariant to the input data.

③ Lots of training data is required.

④ Some common application of this Computer vision today can be seen in:

① Marketing :

Social media platforms provide suggestions who might be in photograph that has been posted on a profile, making it easier to tag friends in photo albums.

② Healthcare : Computer vision has been incorporated into radio log technology, enabling doctors to better identify anomalies in healthy anatomy.

③ Retail :

Visual search has been incorporated into some-commerce platforms, allowing brands to recommend items that would complement an existing wardrobe.



Date

/ /



Conclusion :-

We have successfully implemented a classification technique used to plant leaf diseases detection.