Practical 1

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Aim:-

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.

Objectives:-

i) To implement different deep learning models
ii) To understand hardware acceleration
iii) To illustrate concepts of Artificial Intelligence Machine learning (AI/ML).

Requirements:-

64 bit windows, O.S., python,
python libraries: Tensorflow, pandas, matplotlib, etc, Jupyter notebook

Theory:-

Linear Regression:-

It is a simple but powerful statistical method that aims to model the relationship between a dependent variable (also known as response variable) and one or more independent variables.

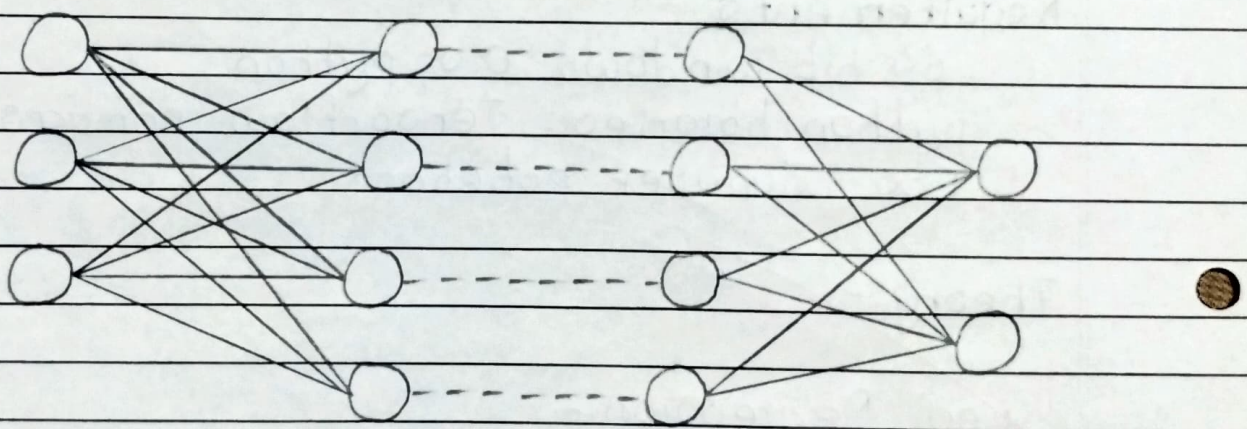
In deep learning, linear regression is used as a basic building block. For more complex models in neural networks, linear regression can be used as a way to combine inputs features to

generate a single output.

Deep Neural Network :-

A deep neural network is an ANN with multiple hidden layers between the input and output layers. Similar to shallow ANN's, Deep Neural Networks can model complex non-linear relationship.

The main purpose of neural network is to receive a set of inputs, perform progressively complex calculations on them and give output to solve real world problems like classification.



A linear regression neural network takes in a vector of input features, multiplies each feature by a weight, adds up the weighted inputs and then passes the results through linear activation function to obtain predicted

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value of depedent variable mathematically as,
$y = w_1 x_1 + w_2 x_2 + w_3 x_3 + \dots w_n x_n + b$
The goal is to find values of weights and bias term that minimize the difference between predicted values and actual values of depedent variables.
This is achieved by using a loss function such as Mean Squared Error (MSE) which measures the average squared difference between them.

Algorithm:-

1) Import all python libraries required such as Tensorflow, numpy, pandas, matplotlib, seaborn, etc.

2) load the dataset and split it into training dataset and testing dataset.

3) Conduct exploratory analysis on both training and testing such as:

   a) Check data shape and type.
   b) Converting data to dataframe using pandas library
   c) View the datasets.
   d) Perform pre-processing on datasets

4) Create Deep Neural Network model.
Train and test the created model.

5) Model Evaluation:
Preview the mean value of training and validation data. Evaluate model on the test data
Plot the loss curves.

6) View the model predictions.

Conclusion:-

Hence, in this assignment we learnt how to implement linear regression and deep neural network models to product predict the price of house in Boston using Boston Housing price prediction dataset.