

Assignment 1

Page No. _____
Date: ____/____/____

Aim: Linear regression by using Deep Neural Network Implement Boston housing price prediction problem by linear regression using Deep network Use Boston Housing price prediction dataset

- Objectives:
- i) To implement different deep learning models
 - ii) To understand Hardware acceleration
 - iii) To illustrate concepts of MAI/ML

Requirements: 64 bit windows, Python, Jupyter Notebook.

Theory

Linear Regression:

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

In deep learning, linear regression is used as a basic building block for more complex model. In neural networks, linear regression can be used as a way to combine inputs/features to generate a single output.

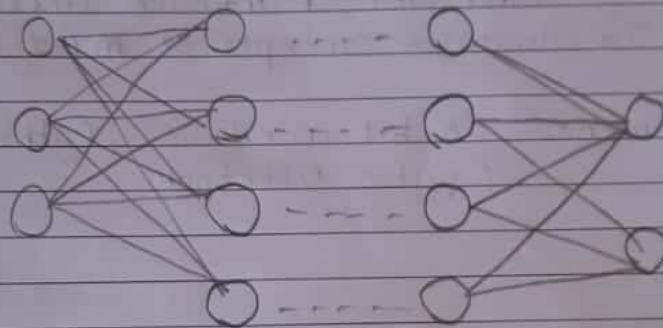
Deep Neural Network-

A deep neural network is an ANN with multiple

11

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.



Input layers	Hidden layer 1	Hidden layer 2	Output layers
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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 value of dependent variable mathematically as, $y = w_1x_1 + w_2x_2 + \dots + w_nx_n + b$. The goal is to find values of weights and bias term that minimize the difference between predicted values and actual values of dependent.

variables. This is achieved by using a loss function such as mean squared error (MSE) which measures the average squared difference between them.

Algorithm:

- i) Import all python libraries required such as tensorflow, numpy, pandas, matplotlib, seaborn, etc.
- ii) Load the dataset and split it into training dataset and testing dataset.
- iii) 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 preprocessing on datasets.
- iv) Create Deep Neural Network model.
Train and Test the created model.
- v) Model Evaluation:
 - Preview the mean value of training and validation data.
 - Evaluate model on the test data.
 - Plot the loss curves.

v) View the model predictions.

Conclusion:

Hence in this assignment we learned how to implement linear regression and deep neural networks models to predict the price of house in Boston using Boston housing price prediction dataset.