

# Learn to Build a Neural network from Scratch using NumPy

## Overview

A neural network is a set of algorithms that aim to recognize the underlying pattern in the data. These are subsets of Machine learning and the heart of deep learning algorithms. Neural networks are inspired by the working of the human brain.

Neural networks are applied in many real-life applications like self-driving cars, speech recognition, medical diagnosis, and many more.

In this project, we will be building a neural network from scratch just by using NumPy only and not by using any deep learning frameworks like Tensorflow or PyTorch. The built neural network will predict the price of the house in Pune, India. This project will also give you an in-depth idea about the working of neural networks.

## Aim

- To understand the working of Neural networks
- To build a neural network from scratch using NumPy

## Data Description

The dataset contains information about the prices of houses based on various attributes. The dataset contains the prices of houses from Pune, Maharashtra(India).

## Tech Stack

- Language: Python
- Libraries: pandas, sci-kit learn, numpy

## Approach

- Data Preprocessing
  - Removing null values
  - Scaling numerical features
  - One-Hot encoding of categorical data
- Model Training
  - Training neural network model

- Model Evaluation
  - Evaluation of model on test data

### **Modular Code Overview:**

Input

|\_Real\_Estate\_Data.xlsx

MLPipeline

|\_Neural\_Network.py

|\_Preprocessing.py

Notebook

|\_nn\_demo.ipynb

Resources

|\_graphics

|\_01\_real\_world.ipynb

|\_02\_history.ipynb

|\_03\_neural\_net.ipynb

Engine.py

Readme.md

requirements.txt

Once you unzip the neural\_network.zip file, you can find the following folders within it.

1. Input
  2. ML\_Pipeline
  3. Notebook
  4. Resources
  5. Engine.py
  6. Readme.md
  7. requirements.txt
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1. The Input folder contains the data that we have for analysis. In our case, it contains the house price prediction dataset
  2. The Notebook folder contains the jupyter notebook file of the project

3. The ML\_pipeline is a folder that contains all the functions put into different python files, which are appropriately named. These python functions are then called inside the Engine.py file
4. The Resources folder contains the materials used in the project
5. The requirements.txt file has all the required libraries with respective versions. Kindly install the file by using the command **pip install -r requirements.txt**
6. **All the instructions for running the code are present in Readme.md file**

### **Takeaways**

1. Real-life applications of deep learning
2. Understanding of deep neural network
3. Timeline of deep learning
4. Deep Learning vs Machine Learning
5. Understand the working of neural network
6. What is a shallow neural network?
7. What is an activation function and why use it?
8. Types of activation function
9. What is loss function?
10. Types of a loss function
11. How deep learning works?
12. Data preprocessing
13. Forward propagation
14. Backward propagation
15. Building neural network using NumPy