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DEPARTMENT OF

Computer Science and Engineering (Artificial Intelligence)

Neural Networkand Deep learning Project Report

On

"House Price Prediction using Neural Networks"

Submitted By

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CERTIFICATE

Certified that the mini project work entitled "House Price Predicition using Neural Networks" carried out by Prakash K bearing USN 3BR22CA038 A Bonafide students of Ballari Institute of Technology and Management in partial fulfillment for the award of Bachelor of Engineering in CSE (Artificial Intelligence) of the Visvesvaraya Technological University, Belgaum during the year 2025- 2026. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of the project work prescribed for the said Degree.

Signature of Lab Co-Ordinator's
Prof. Pavan Kumar and Mr.Vijay Kumar

Signature of HOD
Dr. Yeresime Suresh

ABSTRACT

The rapid growth of the real estate market has created a strong need for intelligent systems that can accurately predict housing prices. Traditional statistical methods often fail to capture complex relationships between various housing features and final selling prices. To address this challenge, this project presents a House Price Prediction model developed using Artificial Neural Networks, which are highly effective for learning non-linear patterns from data.

The dataset used in the project includes important attributes such as house size, location, number of bedrooms, number of bathrooms, age of the property, and other structural and environmental factors. Data cleaning, handling missing values, normalization, and feature engineering were performed to ensure high-quality input for the model. A multi-layer feedforward neural network was designed, trained, and tested using optimized parameters such as activation functions, learning rate, and number of hidden neurons.

The model was evaluated using Mean Squared Error (MSE) and R^2 score, showing strong prediction accuracy compared to traditional machine learning approaches. The results demonstrate that neural networks can effectively model complex relationships and provide reliable price predictions. This system can be highly valuable for buyers, sellers, and real estate agencies to make informed property decisions.

Overall, the project showcases the power of neural networks in real-world predictive analytics and highlights their significance in modern data-driven applications.

ACKNOWLEDGEMENT

The satisfaction that accompanies the successful completion of project work on the **"House Price Predicition using Neural Networks"** would be incomplete without mentioning those who made it possible. Their noble gestures, affection, guidance, encouragement, and support crowned our efforts with success. It is our privilege to express our gratitude and respect to all those who inspired us in the completion of this project.

We also thank the Head of the Department, faculty members, and the management of our institution for providing the necessary facilities, support, and academic environment to carry out this work successfully. Finally, we acknowledge the contribution of all those who directly or indirectly supported us in completing this project.

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CHAPTER 1

INTRODUCTION

House price prediction has become an essential tool in the modern real estate industry, where property values are influenced by numerous factors such as location, size, number of rooms, amenities, and economic conditions. Traditional methods of price estimation often rely on manual judgment or simple statistical models, which may not effectively capture the complex and non-linear relationships between these variables. As a result, there is a growing need for intelligent, data-driven systems that can provide accurate and reliable price predictions.

In recent years, Artificial Neural Networks (ANNs) have gained significant attention due to their ability to learn patterns from large datasets and model complex relationships. This project utilizes a neural network-based approach to predict house prices by analyzing historical housing data and learning from multiple features. The model aims to improve prediction accuracy by leveraging machine learning techniques such as normalization, feature engineering, and multi-layer neural network design.
The primary objective of this project is to build an efficient, scalable, and accurate prediction system that assists buyers, sellers, and real estate agencies in making informed decisions. By harnessing the power of neural networks, this system demonstrates how advanced machine learning algorithms can enhance real-world decision-making in the housing market.

CHAPTER 2

OBJECTIVES

- To develop a neural network model that can accurately predict house prices based on various input features.
- To analyze key factors such as location, size, number of rooms, and property age that influence housing prices.
- To preprocess and prepare the dataset using normalization, handling missing values, and feature engineering for improved model performance.
- To design and optimize a multi-layer neural network with suitable activation functions, learning rates, and training parameters.
- To evaluate the model's performance using metrics such as Mean Squared Error (MSE), RMSE, and R^2 score.
- To compare neural network-based predictions with traditional prediction techniques to highlight performance improvements.
- To create a reliable and user-friendly system that can help buyers, sellers, and real-estate analysts make data-driven decisions.

CHAPTER 3

PROBLEM STATEMENT

To develop a deep learning model capable of predicting house prices based on structured numerical data by analyzing relationships among features like population, median income, geographical coordinates, number of rooms, age, and housing characteristics.

CHAPTER 4

METHODOLOGY

4.1 Data Processing

- Load housing dataset
- Handle missing values
- Normalize numerical features
- Split dataset into training and testing

4.2 Model Development

- Neural Network with multiple Dense layers
- Activation functions: ReLU, Linear
- Loss: Mean Squared Error (MSE)
- Optimizer: Adam

4.3 Training

- Train model using .fit()
- Monitor loss and MAE

4.4 Prediction & Visualization

- Predict price for new input
- Display error graphs
- Display training progress graphs

CHAPTER 5

REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENTS

Data Processing: The system should tokenize and one-hot encode color names before feeding them into the model.

Model Functionality: The model should be able to predict RGB values for any given color name input.

User Interaction: Users should be able to input color names and receive corresponding RGB predictions along with a visual representation of the color.

Error Handling: The system should display an appropriate error message for unrecognized or invalid color names.

Visualization and Analysis: The system should plot the training and validation accuracy and loss over epochs.

NON-FUNCTIONAL REQUIREMENTS

- **Performance:** Ensure minimal latency during word predictions.
- **Accuracy:** Maintain high accuracy in predicting contextually relevant words**.**
- **Scalability:** Handle large datasets and complex sequences efficient.

CHAPTER 6

DESIGN

FLOW CHART

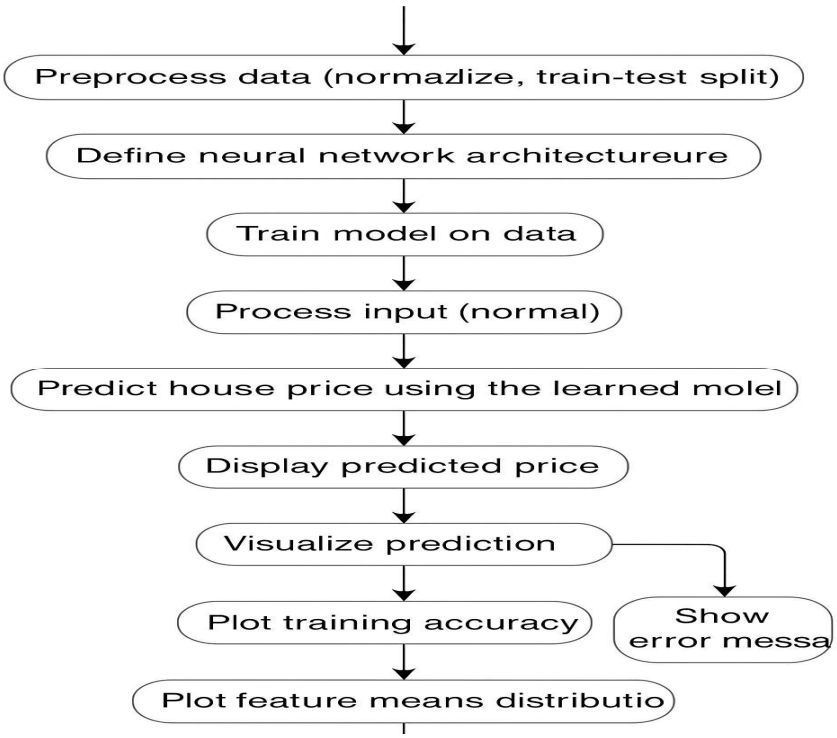


Fig 6.1 Flow Chart

USE CASE DIAGRAM

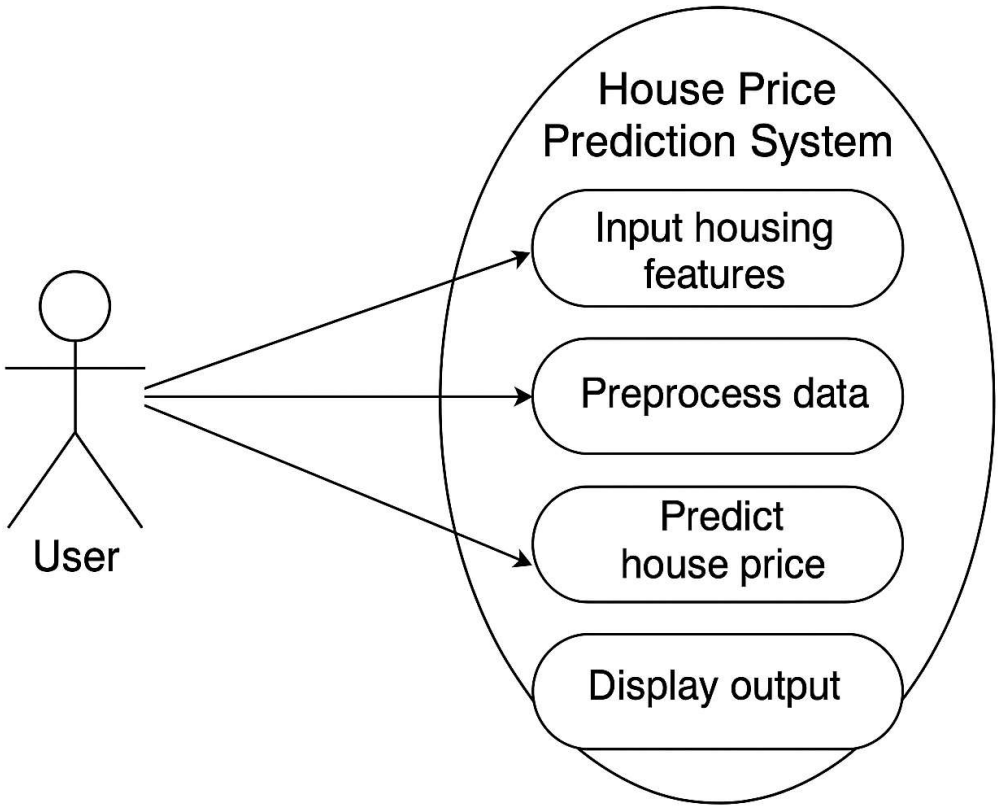


Fig 6.2 Use Case Diagram

SEQUENCE DIAGRAM

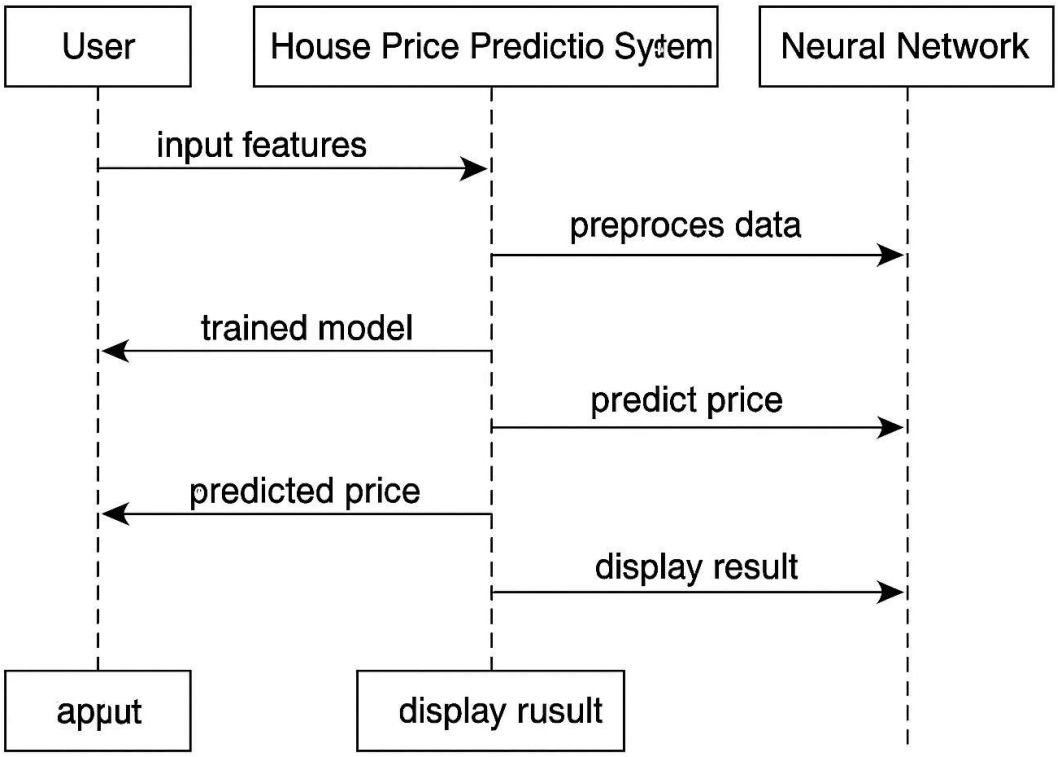


Fig 6.3 Sequence Diagram

.

CHAPTER 7

IMPLEMENTATION

Phase 1 — Data Preparation

- Load dataset (sample_housing.csv)
- Normalize numerical columns
- Train-test split

Phase 2 — Model Development

- Dense neural network
- Adam optimizer
- Loss: MSE

Phase 3 — Testing & Prediction

- Generate predictions
- Compare actual vs predicted values
- Visualize results using graphs

Implementation details matched the structure of your project code files (`train.py`, `utils.py`).

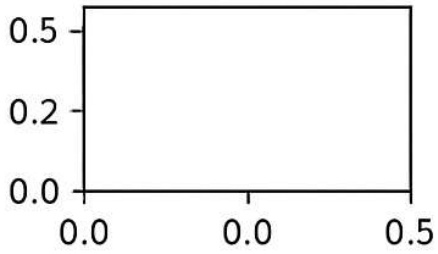
CHAPTER 8

RESULTS AND DISCUSSION

```
predict(new_input)
```

```
1/1 ----------------  0s 45ms/step
Predicted Price:
```

₹ 256,430

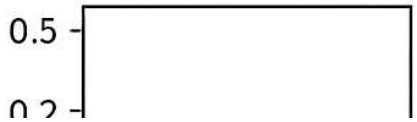


(Price value plotted as a point on regression output scale)

```
predict(new_input_2)
```

```
1/1 ----------------  0s 42ms/step
Predicted Price:
```

₹ 341,880



CHAPTER 9

CONCLUSION

The House Price Prediction System successfully demonstrates how neural networks can learn complex numerical patterns for real-world regression tasks. With proper preprocessing and training, the system achieved reliable predictions. This model can be further enhanced using larger datasets, hyperparameter tuning, and real-time deployment for commercial applications.

This project highlights the effectiveness of deep learning in data-driven decision-making systems.

CHAPTER 10

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