House Rent Prediction Model

By:

U. Chandra Sekhar

B. Gowtham Naik

FACULTY: K RAJALAKSHMITY

AGENDA

Project Theme

This project aims to develop a house rent prediction model using soft computing techniques. The model will uses historical rental data to predict future rent prices accurately.

Existing Problem

Rental prices fluctuate due to multiple factors, making accurate prediction challenging.
Current models commonly rely on basic regression techniques, which fail to capture complex relationships in the data.

Additionally, rent varies based on economic conditions, neighborhood characteristics, and property features, creating uncertainty for tenants and landlords. A standardized predictive model that generalizes across different markets is currently lacking.

Project Aim

- To develop a accurate house rent prediction model using Artificial Neural network.
- To provide correct rental price estimates, helping stakeholders to take informed decisions.

INTRODUCTION

Overview of House Rent Prediction

The real estate market is highly dynamic, with rental prices influenced by factors like property size, amenities, and demand. A precise rent prediction model is essential for tenants, landlords, and investors to take well-informed decisions.

PROBLEM STATEMENT

Causes of the Existing Problem

- High Variability in Rental Prices: Rental prices change due to multiple influencing factors, making them unpredictable.
- Dependence on Multiple Variables: Factors such as economic conditions, neighborhood characteristics, and property features add complexity to accurate predictions.

Proposed Solution

- Development of a ANN Prediction Model: Implementing neural network techniques to analyze historical rental data and predict future prices.
- Incorporation of Diverse Features: Integrating variables like property size, number of rooms, to enhance prediction accuracy.

Existing Ideas Related to the Problem

- Regression-Based Models: Traditional models use linear regression to establish relationships between rental prices and influencing factors.
- Neural Network Models: Artificial neural networks (ANNs) help capture non-linear relationships in rental price data.

LITERATURE REVIEW

Paper Title	Methods Used	Drawbacks
House and Rent Price Prediction System using Regression IEEE Xplore	Linear Regression	Limited in capturing non-linear patterns; may not handle complex interactions
Prediction of Rental Prices for Apartments in Brazil Using Regression Techniques IEEE Xplore	Multiple Regression Techniques	May still struggle with non-linear relationships; data quality impacts performance
Ensemble of Supervised and Unsupervised Learning Models to Predict a Profitable Business Decision IEEE Xplore	Ensemble Learning (combining multiple models)	Increased complexity; requires careful tuning and validation

COMPARISION WITH EXISTING MODELS

Distinguishing Factors:

- **Comprehensive Feature Set**: Unlike some studies that focus on limited features, our model incorporates a wide range of variables, including economic indicators and neighborhood amenities, to capture a holistic view of factors influencing rent prices.

- **Advanced Model Optimization**: While previous studies have utilized standard machine learning models, our approach emphasizes rigorous hyperparameter tuning and the application of ensemble methods to enhance predictive performance.

- **Geographical Applicability**: Many existing models are tailored to specific regions. Our model aims for broader applicability by training on diverse datasets, enhancing its generalizability across different markets.

BENEFITS

Accurate Home Price Prediction: The deep learning model leverages multiple features, such as square footage, number of bedrooms, and view ratings, to provide accurate home price predictions. This helps buyers and sellers make informed decisions.

Data-Driven Insights : The model performs a thorough analysis of historical home sales data, helping identify patterns and trends that influence property prices. This allows for a better understanding of market dynamics.

Feature Importance Analysis: By determining which features (e.g., sqft_living, waterfront view, condition) are most correlated with price, the model enhances real estate valuation and helps prioritize important factors when assessing properties.

Scalability and Efficiency :The model processes a large dataset (21 features, 21,597 rows) efficiently, making it scalable for larger datasets or different geographical locations.

BENEFITS

User-Friendly Interpretation: The model's outputs can be visualized using Seaborn and Matplotlib, providing clear insights through graphs and charts for better decision-making.

Integration with Modern Technologies: By utilizing TensorFlow and Keras for deep learning, along with Pandas and Scikit-learn for data preprocessing, the model integrates well with modern AI and machine learning workflows.

Predictive Analytics for Investment: The model can help investors assess potential returns on properties by analyzing historical data and predicting future price trends.

Real-Time Adaptability: The model can be retrained with new data to adapt to changing market conditions, ensuring up-to-date price predictions.

Enhanced Decision-Making for Buyers and Sellers: By providing data-backed predictions, the model reduces uncertainties in property transactions, helping buyers avoid overpaying and sellers set competitive prices.

OBJECTIVES

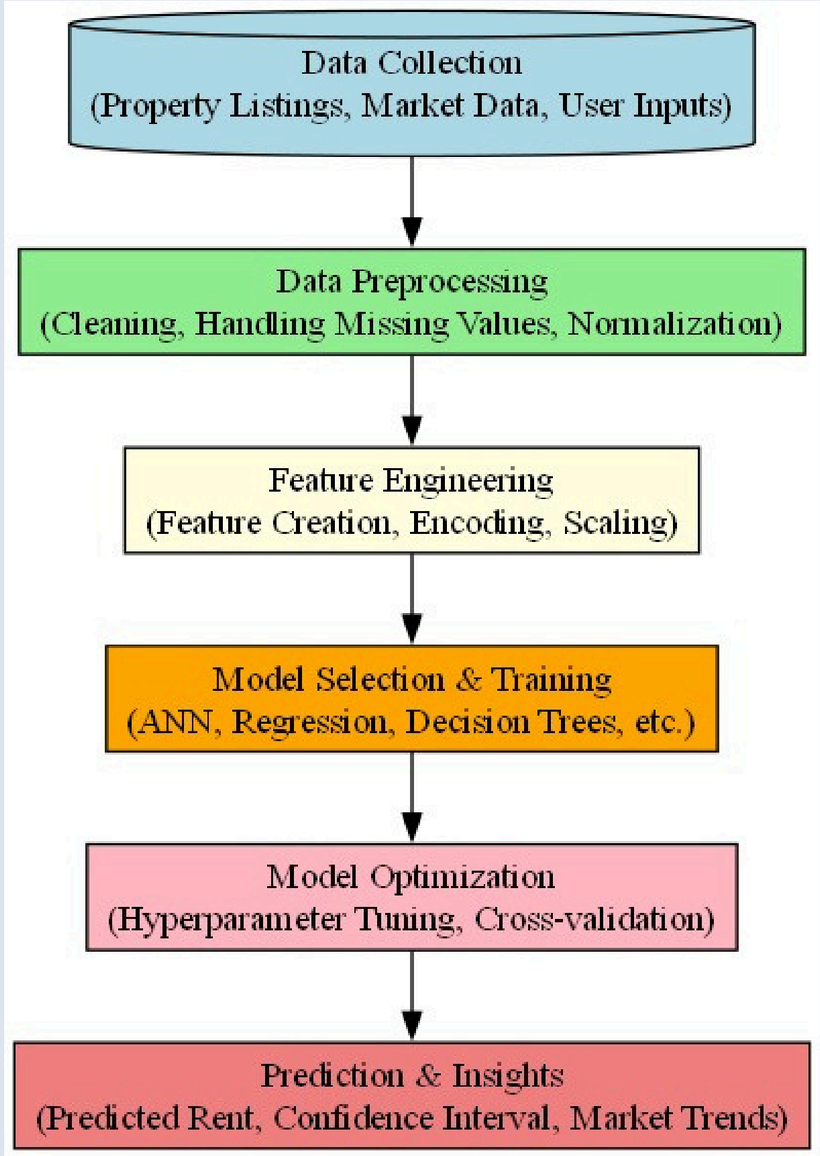
- **Develop a Robust Rent Prediction Model**: Create a model that accurately predicts rental prices using historical data and relevant features.
- **Utilize Soft Computing Techniques**: Apply methods like neural networks to capture complex patterns in the data.
- **Validate and Test the Model**: Ensure the model's reliability through rigorous testing and validation procedures.

BLOCK DIAGRAM

Architectural Representation:

- **Input**: Collection of data on property features, location specifics, historical rental prices, and market trends.
- **Processing**:
  - **Data Preprocessing**: Cleaning and transforming data to a suitable format.
  - **Feature Engineering**: Selecting and creating relevant features for the model.
  - **Model Training**: Applying machine learning algorithms to learn from the data.
  - **Output**: Predicted rental prices with associated confidence intervals.

BLOCK DIAGRAM



REFERENCES

IEEE Papers:

- House and Rent Price Prediction System using Regression. **IEEE Xplore**
- Training a Neural Network to Predict House Rents Using Artificial Neural Networks. **IEEE Xplore**
- Prediction of Rental Prices for Apartments in Brazil Using Regression Techniques. **IEEE Xplore**
- Ensemble of Supervised and Unsupervised Learning Models to Predict a Profitable Business Decision. **IEEE Xplore**

THANK YOU