Project Title	Smart Predictive Modeling for Rental Property Prices
Technologies	Cleansing, EDA, Visualization, ML
Domain	Real Estate & Property Management

Problem Statement:

In the real estate industry, determining the appropriate rental price for a property is crucial for property owners, tenants, and property management companies. Accurate rent predictions can help landlords set competitive prices, tenants make informed rental decisions, and property management companies optimize their portfolio management.

The goal of this project is to develop a data-driven model that predicts the rental price of residential properties based on relevant features. By analyzing historical rental data and property attributes, the model aims to provide accurate and reliable rent predictions.

Dataset:

Dataset_Link: [Data set](#)

Dataset Description:

1. **id:** A unique identifier for each property listing.

2. **type:** The type of property, such as BHK1, BHK2, RK1, etc.

3. **locality:** The specific neighborhood or area where the property is located.

4. **activation_date:** The date when the property listing was activated or made available for rent.

5. **latitude:** The geographic latitude coordinate of the property's location.

6. **longitude:** The geographic longitude coordinate of the property's location.

7. **lease_type:** The type of lease, such as FAMILY or BACHELOR, or ANYONE

8. **gym:** Indicates whether the property has a gym or fitness facility.

9. **lift:** Indicates whether the property has an elevator or lift.

10. **swimming_pool:** Indicates whether the property has a swimming pool.

11. *negotiable:* Indicates whether the rent price is negotiable.

12. *furnishing:* Describes the level of furnishing, e.g., fully furnished, partially furnished, unfurnished.

13. *parking:* Specifies the availability of parking facilities.

14. *property_size:* The size of the property in terms of square footage or square meters.

15. *property_age:* The age of the property since construction.

16. *bathroom:* The number of bathrooms available in the property.

17. *facing:* The direction in which the property faces, e.g., north, south, east, west.

18. *cup_board:* Indicates the presence of cupboards or storage units.

19. *floor:* The floor number on which the property is located.

20. *total_floor:* The total number of floors in the building.

21. *amenities:* Additional amenities or features provided with the property.

22. *water_supply:* The type and availability of water supply.

23. *building_type:* The architectural style or type of building, e.g.,Apartment, Individual House

24. *balconies:* The number of balconies or outdoor spaces.

25. *rent:* The target variable, representing the rental price for the property.

Key Tasks:

1. **Data Preprocessing:**

   Clean and preprocess the features and historical rental prices data, handling missing values, outliers, and encoding categorical variables.

2. **Feature Selection and Engineering:**

   Identify key features that significantly influence rental prices. Perform feature engineering to create new informative features, such as proximity scores to important facilities.

3. **Model Selection:**

   Choose appropriate regression algorithms for the task, such as linear regression, decision trees, random forests, gradient boosting, or neural networks. Consider ensembling or stacking multiple models for improved performance.

4. **Model Training and Evaluation:**

   Split the dataset into training and testing sets. Train the selected models on the training data. Evaluate model performance using appropriate metrics (e.g., mean squared error, mean absolute error) on the testing data.

5. **Hyperparameter Tuning:**

   Fine-tune model hyperparameters to optimize performance.

6. **Interpretability and Explainability:**

   Analyze feature importance to understand which factors contribute most to the predicted rental prices. Provide insights into how specific features impact rental prices.

7. **Deployment:**

   Once a satisfactory model is developed, deploy it as a user-friendly web application or API where users can input property details and receive rent predictions.

Expected Outcomes:

The successful implementation of the house rent prediction model will provide property owners, tenants, and property management companies with a tool to estimate rental prices accurately. This will enhance transparency, aid in decision-making, and contribute to a more efficient and equitable rental market.

Some ideas to do analysis and take insights from given data:

Exploratory Data Analysis:

Analyzing house rent data is essential in a house rent prediction project for several reasons. This analysis serves as the foundation for building an accurate and effective prediction model.

Certainly! Here are some analysis questions you could explore using the dataset columns:

1. Correlation Analysis:

  - How does the number of bedrooms and bathrooms affect the rent price?
  - Is there a correlation between the property size and rent price?
  - Do properties with more amenities tend to have higher rent prices?

2. Geospatial Analysis:

  - Are there specific localities or neighborhoods where rent prices are generally higher?
  - Is there any correlation between latitude/longitude and rent prices?
  - How does the availability of amenities like swimming pools, gyms, or parks vary across different areas?

3. Temporal Analysis:

  - Are there any trends in rent prices based on activation date?
  - Does the property age impact the rent price, and has this relationship changed over time?

4. Property Features and Rent:

  - How does the presence of certain features like a gym, lift, or parking affect the rent price?
  - Does the furnishing level (fully furnished, partially furnished, unfurnished) influence the rent?

5. Building Characteristics:

  - Is there a difference in rent prices between high-floors and low-floors buildings?
  - How does the number of total floors in a building relate to the rent price?

6. Negotiability and Rent:

  - Do negotiable rent prices tend to be higher or lower than fixed rent prices?
  - Is there a difference in rent between family and anyone leases?

7. Balconies and Rent:

  - How does the number of balconies in a property impact its rent price?
  - Is there a correlation between the property's facing direction and rent price?

8. Amenities and Rent:

  - Are certain amenities more strongly correlated with higher rent prices?
  - How does the availability of amenities like swimming pools or gyms affect rent?

9. Water Supply and Building Type:

  - Do properties with certain types of water supply tend to have higher rent?
  - Does the building type (e.g., IH, AP) have an influence on rent prices?

10. Predictive Analysis:

   - Can we build a predictive model to accurately estimate rent prices based on the given attributes?
  - Which features have the most significant impact on rent predictions according to the model?

Note:

After completion of all the task you need to create a PowerPoint presentation

That should contain the:

1. Problem Statement

2. Tools Used

3. Approaches

4. EDA Insights

Project Evaluation metrics:

- You are supposed to write a code in a modular fashion (in functional blocks)
- Maintainable: It can be maintained, even as your codebase grows.
- Portable: It works the same in every environment (operating system)
- You have to maintain your code on GitHub.(Mandatory)
- You have to keep your GitHub repo public so that anyone can check your code.(Mandatory)
- Proper readme file you have to maintain for any project development(Mandatory)
- You should include basic workflow and execution of the entire project in the readme file on GitHub
- Follow the coding standards: https://www.python.org/dev/peps/pep-0008/
- You need to Create a Demo video / Presentation of your Project and post in LinkedIn(Mandatory)