

Title:

House Price Prediction using Machine Learning with Python GUI (Tkinter + Linear Regression)

Aim:

To develop a simple machine learning application with a graphical user interface (GUI) using Tkinter that predicts house prices based on input features such as size, number of bedrooms, and age of the house.

Theory:

Machine Learning (ML) is a branch of Artificial Intelligence that enables systems to learn patterns from data and make predictions or decisions without being explicitly programmed.

In this project, we use **Linear Regression**, one of the most fundamental algorithms in ML, to model the relationship between house features and their prices.

Linear Regression Formula:

$$y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_nx_n$$

Where:

- y = Predicted price of the house
- x_1, x_2, x_3, \dots = Input features (e.g., size, bedrooms, age)
- b_0 = Intercept
- b_1, b_2, b_3, \dots = Coefficients (weights learned by the model)

The algorithm minimizes the error between the predicted and actual prices using the **least squares method**.

Implementation:

1. Dataset Creation

A small dataset is created manually with columns:

- Size (in sqft)
- Bedrooms
- Age (in years)
- Price (target variable)

Example:

Size	Bedrooms	Age	Price
1000	2	10	200000
1500	3	5	280000
1800	4	20	340000
2400	3	15	400000
3000	4	8	480000

2. Model Training

python

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```
from sklearn.linear_model import LinearRegression  
model = LinearRegression()  
model.fit(X, y)
```

3. GUI Design (Tkinter)

- Created a simple Tkinter window.
- Added entry fields for `Size`, `Bedrooms`, and `Age`.
- Added a **Predict Price** button to trigger prediction.
- Displayed the predicted price dynamically on the screen.

4. Prediction Function

When the user inputs details and clicks “Predict Price,” the app:

- Fetches user input
- Converts it to numeric values
- Passes it to the ML model
- Displays the predicted price in rupees (₹ format)

Real-world Use Case:

This type of application can be integrated into:

- **Real Estate Websites/Apps:** To estimate the market value of properties.
- **Banking/Finance Systems:** For loan evaluation and mortgage approval.
- **Urban Planning:** To analyze property trends based on various factors.
- **Construction Companies:** To predict property valuation before investment.

Conclusion:

This project demonstrates how **Machine Learning** can be integrated with a **Graphical User Interface (GUI)** to create an interactive and user-friendly predictive tool.

By using **Linear Regression**, the app provides quick and interpretable predictions of house prices based on essential features.

Although the dataset here is small, this concept can easily be scaled with larger, real-world datasets for accurate and practical predictions in the real estate industry.