Forecasting House Prices accurately Using Smart Regression

Techniques in Data Science

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**Github Repository Link:**[**https://github.com/heefakhan/heefa**](https://github.com/heefakhan/heefa)

# 1. Problem Statement

Accurately forecasting house prices is crucial for buyers, sellers, investors, and real estate companies. This project aims to create robust regression models that leverage advanced data science techniques to predict housing prices based on multiple factors such as location, size, condition, and amenities.

# 2. Project Objectives

* Develop regression models that can predict house prices with high accuracy.
* Compare traditional regression methods with smart techniques like ensemble methods and regularization.
* Ensure real-world applicability and interpretability of results.

# Project Workflow (Flowchart )

Data Collection -> Preprocessing -> EDA -> Feature Engineering -> Model Training -> Evaluation ->

Visualization -> Reporting

# Data Description

* Dataset Source: Kaggle (e.g., Ames Housing Dataset )
* Type: Structured Tabular Data
* Records: ~2,900; Features: ~ 80
* Supervised learning with target variable: SalePrice

# Data Preprocessing

* Imputed missing values (mean, median, mode )
* Removed duplicates and outliers
* Encoded categorical variables (One-Hot Encoding )
* Scaled features using StandardScaler

# Exploratory Data Analysis (EDA )

* Visualized distributions, correlations, and key relationships
* Identified top influencing factors like overall quality, living area, and neighborhood
* Detected multicollinearity among numeric features

# Feature Engineering

* Created new features like price per square foot
* Binned year variables to capture age categories
* Applied polynomial and interaction terms
* Optional: Used PCA to reduce dimensionality

# Model Building

* Linear Regression (Baseline )
* Ridge and Lasso Regression (to reduce overfitting )
* Random Forest Regressor and XGBoost (smart regression techniques )
* Evaluation metrics: RMSE, MAE, R²

# Visualization of Results & Insights

* Feature importance (Random Forest, XGBoost )
* Residual plots for error analysis
* RMSE comparison chart
* Interpretable summaries of model outputs

# Tools and Technologies Used

* **Language:** Python
* **IDE**: Jupyter Notebook
* **Libraries:** pandas, numpy, matplotlib, seaborn, scikit-learn, xgboost
* **Visualization:** Plotly, Seaborn

# Team Members and Contributions

* Data Cleaning & Preprocessing: Aashara Begam.H
* EDA & Feature Engineering: Abinaya.S
* Modeling: Heefa Sharin.M
* Reporting & Documentation: Archana.KS