

Submitted	By:
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Section: 4A

Task: 01

Subject: PAI(lab)

Submitted to: Sir Rasikh Ali

https://www.kaggle.com/code/umehabibaakbarali/house-pricing-predicition

1. Environment Setup and Data Loading

- The notebook starts by importing necessary libraries such as pandas, numpy, and os.
- It lists the files available in the input directory using os.walk.
- The dataset (train.csv) is loaded into a pandas DataFrame (df).

2. Data Exploration

• The first few rows of the dataset are displayed using df.head(5) to get an initial look at the data.

3. Data Preprocessing

Handling Missing Values:

- o Columns with more than 50% missing values are dropped.
- Missing values in numerical columns are filled with the median, and missing values in categorical columns are filled with the string 'Unknown'.

• Encoding Categorical Variables:

o Categorical columns are one-hot encoded using pd.get_dummies.

4. Model Training and Evaluation

- The target variable (SalePrice) is separated from the features.
- The data is split into training and validation sets using train test split.
- A RandomForestRegressor model is trained on the training data.
- The model's performance is evaluated on the validation set using metrics such as Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), and R² score.

5. Submission Preparation

- The model is used to predict house prices on a test dataset (test.csv).
- The predictions are saved to a CSV file (submission.csv) for submission, typically to a competition platform like Kaggle.

6. Additional Model Training

- A simpler model is trained using a subset of features (LotArea, YearBuilt, 1stFlrSF, 2ndFlrSF, FullBath, BedroomAbvGr, TotRmsAbvGrd).
- This model is also evaluated using Mean Absolute Error (MAE), and predictions are saved to a submission file.

Libraries Used:

- **Pandas:** For data manipulation and analysis.
- NumPy: For numerical operations.
- **Scikit-learn:** For machine learning tasks, including model training, evaluation, and data splitting.
- **Matplotlib/Seaborn:** Although not explicitly used in this notebook, these libraries are often used for data visualization in similar projects.

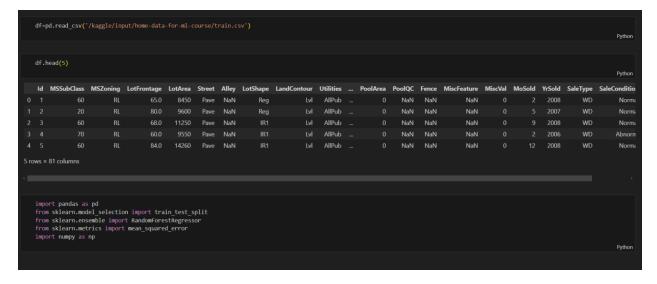
```
# This Python 3 environment comes with many helpful analytics libraries installed
# It is defined by the kaggle/python Docker image: https://github.com/kaggle/docker-python
# For example, here's several helpful packages to load

import pandas as pd
import numpy as np
# Input data files are available in the read-only "../input/" directory
# For example, running this (by clicking run or pressing Shift+Enter) will list all files under the input directory

import os
for dirname, , filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))

# You can write up to 2008 to the current directory (/kaggle/working/) that gets preserved as output when you create a version using "Save & Run All"
# You can also write temporary files to /kaggle/temp/, but they won't be saved outside of the current session

/kaggle/input/home-data-for-ml-course/sample_submission.csv
/kaggle/input/home-data-for-ml-course/tain.csv.gz
/kaggle/input/home-data-for-ml-course/tain.csv.gz
/kaggle/input/home-data-for-ml-course/tain.csv.gz
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/kaggle/input/home-data-for-ml-course/tain.csv
```



```
#Encoded

df = pd.get_dummies(df, columns=categorical_cols, drop_first=True)

Test_Train Spliting

target = 'salePrice' # Target variable for this dataset
    x = df.drop(columns=[target])
    y = df[target]

assert x.select_dtypes(include=['object']).empty, "There are still non-numeric columns in x"

# split data into training and validation sets
    x_train, x_val, y_train, y_val = train_test_split(x, y, test_size=0.2, random_state=42)
```

```
Rf = RandomForestRegressor(n estimators=100, random state=42)
         RandomForestRegressor
 RandomForestRegressor(random state=42)
   from \ sklearn.metrics \ import \ mean\_squared\_error, \ mean\_absolute\_error, \ r2\_score
   y_pred = Rf.predict(X_val)
    rmse = np.sqrt(mean_squared_error(y_val, y_pred))
   print(f"Root Mean Squared Error (RMSE): {rmse}")
mae = mean_absolute_error(y_val, y_pred)
   r2 = r2_score(y_val, y_pred)
print(f"Mean Absolute Error (MAE): {mae:.2f}")
   print(f"R^2 Score: {r2:.2f}")
Root Mean Squared Error (RMSE): 29311.513541784003
Mean Absolute Error (MAE): 17687.96
R^2 Score: 0.89
   from sklearn.model selection import train test split
   from sklearn.ensemble import RandomForestRegressor
   y = data['SalePrice']
   X = data[features]
# Split data into training and validation datasets
   X_train, X_valid, y_train, y_valid = train_test_split(X, y, train_size=0.8, test_size=0.2, random_state=0)
   model = RandomForestRegressor(random_state=0)
   model.fit(X_train, y_train)
   preds = model.predict(X_valid)
   mae = mean_absolute_error(y_valid, preds)
   print(f"Mean Absolute Error: {mae}")
   # Prepare test data for submission
test_data = pd.read_csv('.../input/home-data-for-ml-course/test.csv')  # Adjust path as needed
   X_test = test_data[features]
   test_preds = model.predict(X_test)
     test_data = pd.read_csv('.../input/home-data-for-ml-course/test.csv') # Adjust path as needed
    X_test = test_data[features]
    test_preds = model.predict(X_test)
    # Create a DataFrame for submission
     output = pd.DataFrame({'Id': test_data.Id, 'SalePrice': test_preds})
    output.to_csv('submission.csv', index=False)
     print("Submission file saved as submission.csv")
Mean Absolute Error: 23740.979228636657
Submission file saved as submission.csv
```