PROJECT REPORT

Real Estate Price Prediction

Submitted by

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Course Code INT246

Under the Guidance of
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School of Computer Science and Engineering

LOVELY
PROFESSIONAL
UNIVERSITY

Declaration

We hereby declare that the project work entitled Celebrity face Recognition is an authentic record of our own work carried out as requirements of Project for the award of B.Tech degree in CSE from Lovely Professional University, Phagwara, under the guidance of (Name of Faculty Mentor), during August to November 2020. All the information furnished in this project report is based on our own intensive work and is genuine.

Mudit Giria

11909086

MGiria

Certificate

This is to certify that the declaration statement made by this group of students is correct to the best of my knowledge and belief. They have completed this Project under my guidance and supervision. The present work is the result of their original investigation, effort and study. No part of the work has ever been submitted for any other degree at any University. The Project is fit for the submission and partial fulfillment of the conditions for the award of B.Tech degree in CSE from Lovely Professional University, Phagwara

Signature and Name of the Mentor

Dr. Sagar Pande

Professor Lovely Professional University

School of Computer Science and Engineering,
Lovely Professional university,
Phagwara, Punjab.

Acknowledgment

Foremost, I would like to express my sincere gratitude to my mentor and advisor Prof, Sagar Pande for the continuous support of my project , for his patience, motivation, enthusiasm, and immense knowledge . His guidance helped me in all the time of project. I could not have imagined having a better advisor and mentor for my project.

Mudit Giria

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Introduction

What is Real Estate Price Prediction?

Prediction house prices are expected to help people who plan to buy a house so they can know the price range in the future, then they can plan their finance well. In addition, house price predictions are also beneficial for property investors to know the trend of house prices in a certain location

Real estate price prediction is the process of taking raw data set in a csv format and then analyzing various features of the property and then giving the estimated price of the property

What variables predict real estate prices?

Different factors considered for predicting the house prices are Median Income, Crime rate, Age and Condition, The local Market, Neighborhood, Public Schools, Hospitals and Hospital Ratings, Unemployment rate in that county and last but not the least the furnishing of the house.

How is Market Value decided for a property?

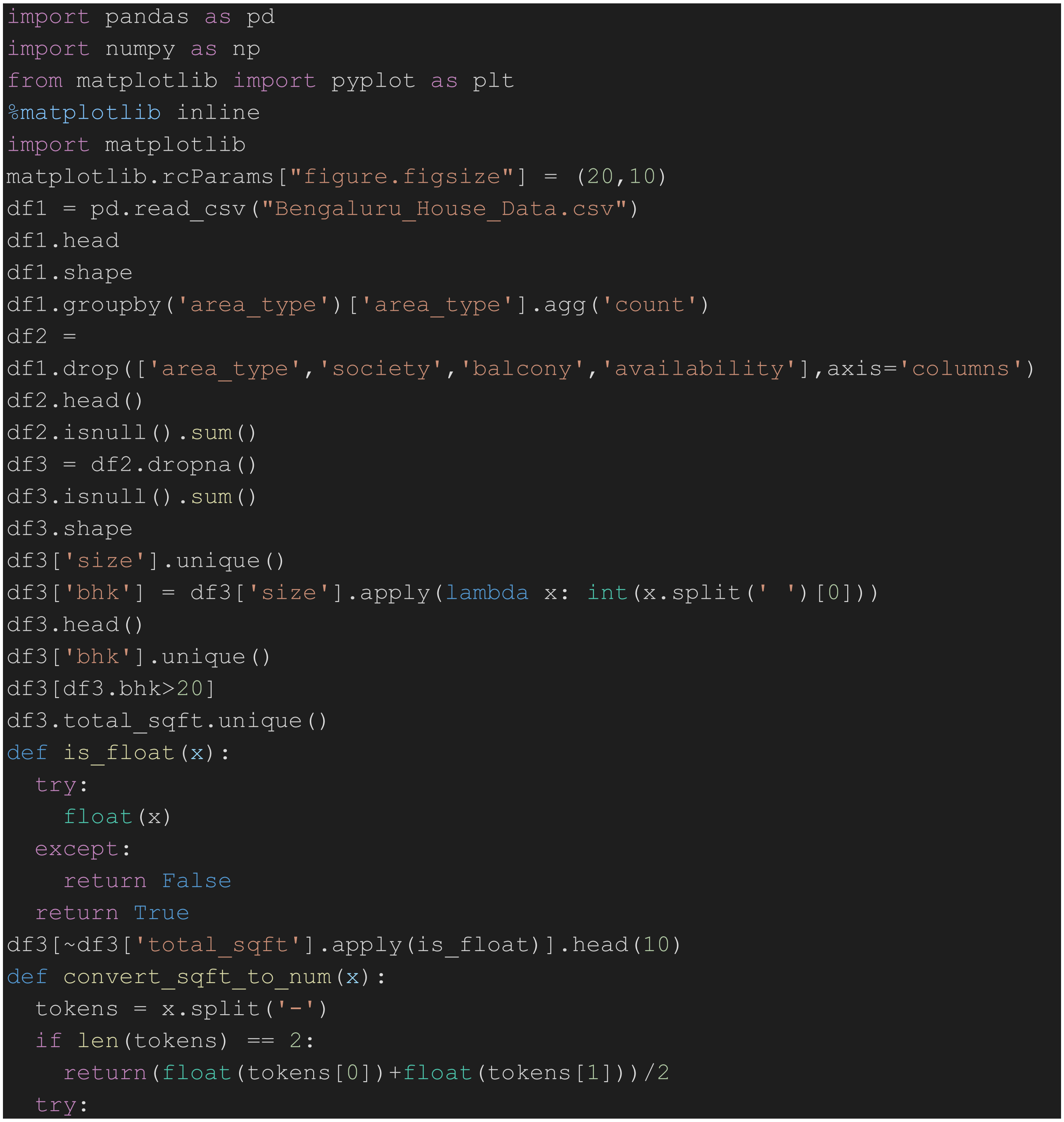
During a home sale, the bank that offers the home loan will typically select an appraiser to render an opinion about the value of real estate as of a specific date. Comparable sales, also known as the "Market Data" approach, is the most common way to arrive at market value

Why is real estate price prediction Important?

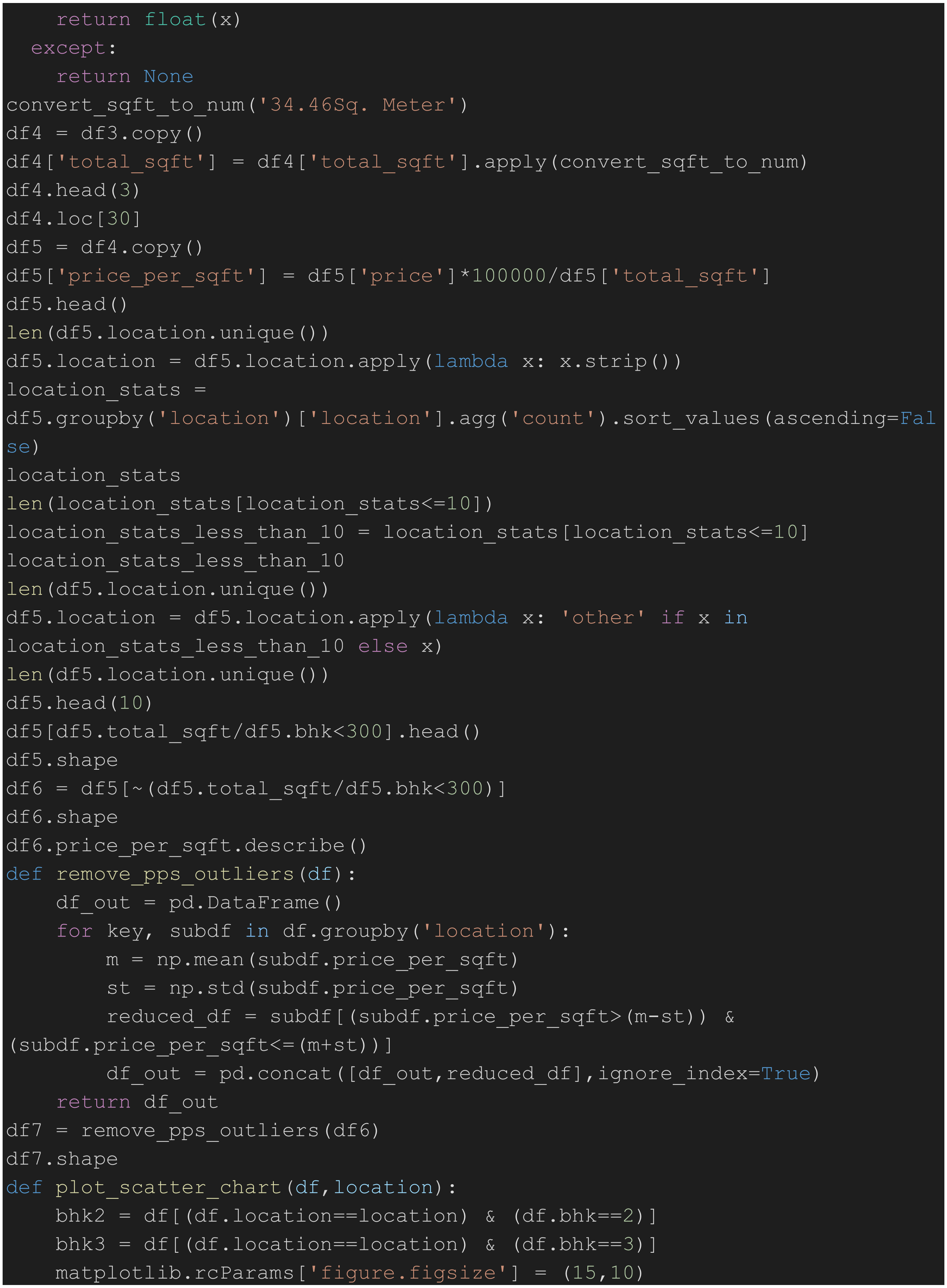
House price prediction, is important to drive Real Estate efficiently. As earlier, house prices were determined by calculating the acquiring and selling price in a

locality. Therefore, the house price prediction model is very essential in filling the information gap and improve real estate efficiency.

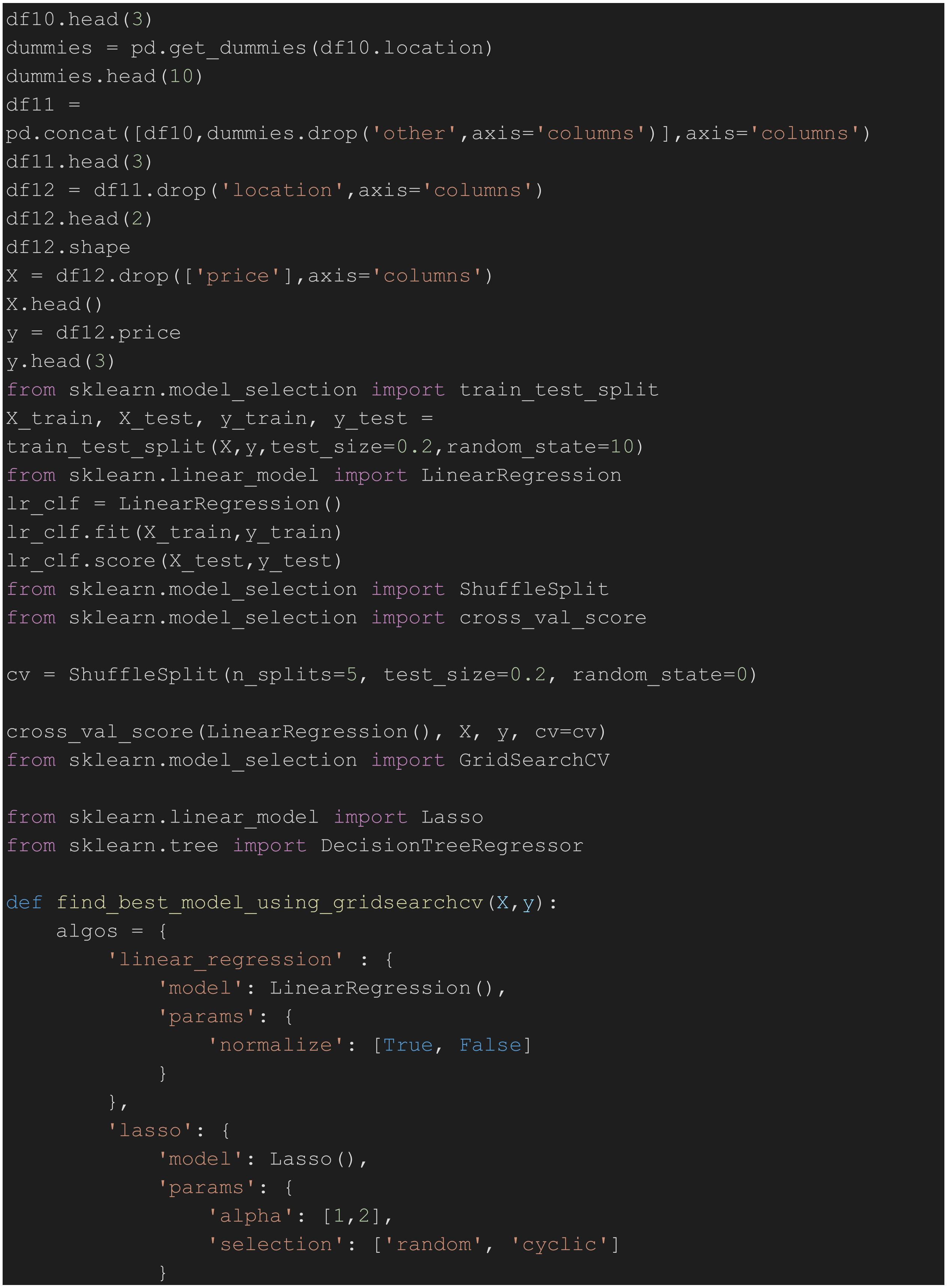
CODE



```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
%matplotlib inline
import matplotlib
matplotlib.rcParams["figure.figsize"] = (20,10)
df1 = pd.read_csv("Bengaluru_House_Data.csv")
df1.head
df1.shape
df1.groupby('area_type')['area_type'].agg('count')
df2 =
df1.drop(['area_type','society','balcony','availability'],axis='columns')
df2.head()
df2.isnull().sum()
df3 = df2.dropna()
df3.isnull().sum()
df3.shape
df3['size'].unique()
df3['bhk'] = df3['size'].apply(lambda x: int(x.split(' ')[0]))
df3.head()
df3['bhk'].unique()
df3[df3.bhk>20]
df3.total_sqft.unique()
def is_float(x):
  try:
    float(x)
  except:
    return False
  return True
df3[~df3['total_sqft'].apply(is_float)].head(10)
def convert_sqft_to_num(x):
  tokens = x.split('-')
  if len(tokens) == 2:
    return(float(tokens[0])+float(tokens[1]))/2
  try:
```



```
    return float(x)
  except:
    return None
convert_sqft_to_num('34.46Sq. Meter')
df4 = df3.copy()
df4['total_sqft'] = df4['total_sqft'].apply(convert_sqft_to_num)
df4.head(3)
df4.loc[30]
df5 = df4.copy()
df5['price_per_sqft'] = df5['price']*100000/df5['total_sqft']
df5.head()
len(df5.location.unique())
df5.location = df5.location.apply(lambda x: x.strip())
location_stats =
df5.groupby('location')['location'].agg('count').sort_values(ascending=False)
location_stats
len(location_stats[location_stats<=10])
location_stats_less_than_10 = location_stats[location_stats<=10]
location_stats_less_than_10
len(df5.location.unique())
df5.location = df5.location.apply(lambda x: 'other' if x in
location_stats_less_than_10 else x)
len(df5.location.unique())
df5.head(10)
df5[df5.total_sqft/df5.bhk<300].head()
df5.shape
df6 = df5[~(df5.total_sqft/df5.bhk<300)]
df6.shape
df6.price_per_sqft.describe()
def remove_pps_outliers(df):
    df_out = pd.DataFrame()
    for key, subdf in df.groupby('location'):
        m = np.mean(subdf.price_per_sqft)
        st = np.std(subdf.price_per_sqft)
        reduced_df = subdf[(subdf.price_per_sqft>(m-st)) &
(subdf.price_per_sqft<=(m+st))]
        df_out = pd.concat([df_out,reduced_df],ignore_index=True)
    return df_out
df7 = remove_pps_outliers(df6)
df7.shape
def plot_scatter_chart(df,location):
    bhk2 = df[(df.location==location) & (df.bhk==2)]
    bhk3 = df[(df.location==location) & (df.bhk==3)]
    matplotlib.rcParams['figure.figsize'] = (15,10)
    plt.scatter(bhk2.total_sqft,bhk2.price,color='blue',label='2 BHK',
s=50)
    plt.scatter(bhk3.total_sqft,bhk3.price,marker='+',
color='green',label='3 BHK', s=50)
    plt.xlabel("Total Square Feet Area")
    plt.ylabel("Price (Lakh Indian Rupees)")
    plt.title(location)
    plt.legend()

plot_scatter_chart(df7,"Rajaji Nagar")
plot_scatter_chart(df7,"Hebbal")
def remove_bhk_outliers(df):
    exclude_indices = np.array([])
    for location, location_df in df.groupby('location'):
        bhk_stats = {}
        for bhk, bhk_df in location_df.groupby('bhk'):
            bhk_stats[bhk] = {
                'mean': np.mean(bhk_df.price_per_sqft),
                'std': np.std(bhk_df.price_per_sqft),
                'count': bhk_df.shape[0]
            }
        for bhk, bhk_df in location_df.groupby('bhk'):
            stats = bhk_stats.get(bhk-1)
            if stats and stats['count']>5:
                exclude_indices = np.append(exclude_indices,
bhk_df[bhk_df.price_per_sqft<(stats['mean'])].index.values)
    return df.drop(exclude_indices,axis='index')
df8 = remove_bhk_outliers(df7)
# df8 = df7.copy()
df8.shape
plot_scatter_chart(df8,"Hebbal")
import matplotlib
matplotlib.rcParams["figure.figsize"] = (20,10)
plt.hist(df8.price_per_sqft,rwidth=0.8)
plt.xlabel("Price Per Square Feet")
plt.ylabel("Count")
df8.bath.unique()
df8[df8.bath>10]
plt.hist(df8.bath,rwidth=0.8)
plt.xlabel("Number of bathrooms")
plt.ylabel("Count")
df8[df8.bath>df8.bhk+2]
df9 = df8[df8.bath<df8.bhk+2]
df9.shape
df10 = df9.drop(['size','price_per_sqft'],axis='columns')
```

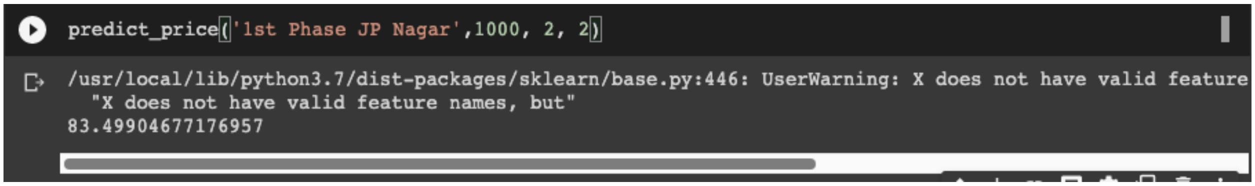


```
df10.head(3)
dummies = pd.get_dummies(df10.location)
dummies.head(10)
df11 =
pd.concat([df10,dummies.drop('other',axis='columns')],axis='columns')
df11.head(3)
df12 = df11.drop('location',axis='columns')
df12.head(2)
df12.shape
X = df12.drop(['price'],axis='columns')
X.head()
y = df12.price
y.head(3)
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test =
train_test_split(X,y,test_size=0.2,random_state=10)
from sklearn.linear_model import LinearRegression
lr_clf = LinearRegression()
lr_clf.fit(X_train,y_train)
lr_clf.score(X_test,y_test)
from sklearn.model_selection import ShuffleSplit
from sklearn.model_selection import cross_val_score

cv = ShuffleSplit(n_splits=5, test_size=0.2, random_state=0)

cross_val_score(LinearRegression(), X, y, cv=cv)
from sklearn.model_selection import GridSearchCV

from sklearn.linear_model import Lasso
from sklearn.tree import DecisionTreeRegressor

def find_best_model_using_gridsearchcv(X,y):
    algos = {
        'linear_regression' : {
            'model': LinearRegression(),
            'params': {
                'normalize': [True, False]
            }
        },
        'lasso': {
            'model': Lasso(),
            'params': {
                'alpha': [1,2],
                'selection': ['random', 'cyclic']
            }
        },
        'decision_tree': {
            'model': DecisionTreeRegressor(),
            'params': {
                'criterion' : ['mse','friedman_mse'],
                'splitter': ['best','random']
            }
        }
    }
    scores = []
    cv = ShuffleSplit(n_splits=5, test_size=0.2, random_state=0)
    for algo_name, config in algos.items():
        gs =  GridSearchCV(config['model'], config['params'], cv=cv,
return_train_score=False)
        gs.fit(X,y)
        scores.append({
            'model': algo_name,
            'best_score': gs.best_score_,
            'best_params': gs.best_params_
        })

    return
pd.DataFrame(scores,columns=['model','best_score','best_params'])

find_best_model_using_gridsearchcv(X,y)
X.columns
np.where(X.columns=='2nd Phase Judicial Layout')[0][0]
def predict_price(location,sqft,bath,bhk):
    loc_index = np.where(X.columns==location)[0][0]

    x = np.zeros(len(X.columns))
    x[0] = sqft
    x[1] = bath
    x[2] = bhk
    if loc_index >= 0:
        x[loc_index] = 1

    return lr_clf.predict([x])[0]
predict_price('1st Phase JP Nagar',1000, 2, 2)
predict_price('1st Phase JP Nagar',10000, 5, 5)
predict_price('1st Phase JP Nagar',1000, 3, 3)
```

How to Check Output?

You just have to write a single line with some syntax “ predict_price(‘name_of_location’, area(in square_ft), rooms, bathrooms) ”
Area rooms and bathrooms must be numeric then it would give you a predicted price in lakhs
For an example: predict_price(‘1st Phase JP Nagar’, 1000, 2, 2)
Now the code would return 83.49904677176957 which means roughly 83.5 lakhs

Output



```
predict_price('1st Phase JP Nagar',1000, 2, 2)
```

```
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:446: UserWarning: X does not have valid feature
  "X does not have valid feature names, but"
83.49904677176957
```