In [85]:
```
# importing basic python libraries , ml linaar regression and  some metrics
# uploading datasets and printing the first five rows of the data
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
import seaborn as sns
from sklearn.metrics import mean_squared_error
from pandas.plotting import scatter_matrix
housing = pd.read_csv("C:/Users/IT676/Downloads/housing.csv")
housing.head()
```

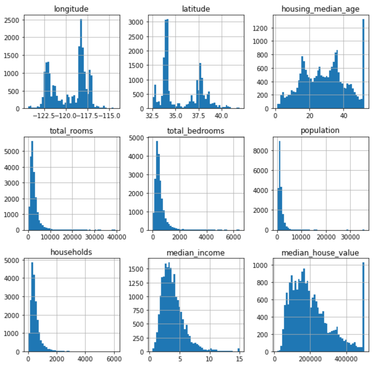
Out[85]:

	longitude	latitude	housing_median_age	total_rooms	total_bedrooms	population	households	median_income	median_house_value	ocean_proximity
0	-122.23	37.88	41.0	880.0	129.0	322.0	126.0	8.3252	452600.0	NEAR BAY
1	-122.22	37.86	21.0	7099.0	1106.0	2401.0	1138.0	8.3014	358500.0	NEAR BAY
2	-122.24	37.85	52.0	1467.0	190.0	496.0	177.0	7.2574	352100.0	NEAR BAY
3	-122.25	37.85	52.0	1274.0	235.0	558.0	219.0	5.6431	341300.0	NEAR BAY
4	-122.25	37.85	52.0	1627.0	280.0	565.0	259.0	3.8462	342200.0	NEAR BAY

In [86]:
```
# checking for datasets information
housing.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 20640 entries, 0 to 20639
Data columns (total 10 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   longitude           20640 non-null  float64
 1   latitude            20640 non-null  float64
 2   housing_median_age  20640 non-null  float64
 3   total_rooms         20640 non-null  float64
 4   total_bedrooms      20433 non-null  float64
 5   population          20640 non-null  float64
 6   households          20640 non-null  float64
 7   median_income       20640 non-null  float64
 8   median_house_value  20640 non-null  float64
 9   ocean_proximity     20640 non-null  object 
dtypes: float64(9), object(1)
memory usage: 1.6+ MB
```

In [87]:
```
# Plotting the histogram of the features(columns)
import matplotlib.pyplot as plt
housing.hist(bins=50, figsize=(10, 10))
plt.show()
```



In [88]:
```
# defining parmeters and imputing null values by medain
y = housing['median_house_value']
x = housing.drop('median_house_value', axis = 1)
x['total_bedrooms'].fillna(x.total_bedrooms.median(), inplace = True )
```

In [89]:
```
# adding extra features and Splitting data
x['rooms_per_house'] = x['total_rooms']/x['households']
x['bedrooms_per_room'] = x['total_bedrooms']/x['total_rooms']
x['population_per_houshold'] = x['population']/x['households']
x_train, x_test, y_train, y_test = train_test_split(x, y)
```

In [90]:
```
len(x_train)
```

Out[90]:
```
15480
```

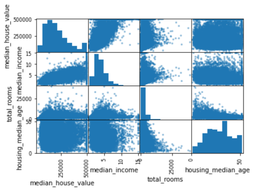
In [91]:
```
# creating Correlation matrix for training data
train = x_train.join(y_train)
corr_mat = train.corr()
```

In [92]:
```
# printing the correlation matrix for training data
corr_mat['median_house_value'].sort_values(ascending = False)
```

Out[92]:
```
median_house_value          1.000000
median_income               0.688038
rooms_per_house             0.142828
total_rooms                 0.132317
housing_median_age          0.102951
households                  0.064118
total_bedrooms              0.047654
population_per_houshold    -0.021639
population                 -0.024684
longitude                  -0.054503
latitude                   -0.136682
bedrooms_per_room          -0.250013
Name: median_house_value, dtype: float64
```

In [93]:
```
# creating a new matrix for chossing features (colouumns )
housing_cols = train[['median_house_value','median_income','total_rooms','housing_median_age']]
```

In [94]:
```
# Plotting the scatter plot for the matrix
scatter_matrix(housing_cols);
```



In [95]:
```
# Bulding ML ( linear regression) model
lm = LinearRegression()
x = train['median_income'].values.reshape(-1,1)
y = train['median_house_value']
lm.fit(x,y)
predict = lm.predict(x)
```

In [96]:
```
# printing predicted values
predict
```

Out[96]:
```
array([252348.21525704, 154352.93723867, 264212.12119709, ...,
       196764.62494052, 360297.64049245, 134870.89092219])
```

In [97]:
```
print("Training Accuracy :", lm.score(x, y))
```

```
Training Accuracy : 0.47339685374682916
```

In [98]:
```
# printing mean squared error score for testing
mse = mean_squared_error(predict, y)
np.sqrt(mse)
```

Out[98]:
```
83324.89214385033
```

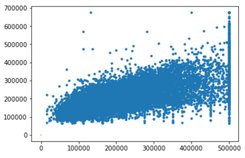
In [99]:
```
# comparing between True and predicted values and finding the difference between them
Pridiction_values_df = pd.DataFrame({'True Value':y,'Predictied value':predict, 'Difference':y-predict })
Pridiction_values_df[0:10]
```

Out[99]:

	True Value	Predictied value	Difference
1912	206300.0	252348.215257	-46048.215257
7341	156000.0	154352.937239	1647.062761
11524	226100.0	264212.121197	-38112.121197
14105	92400.0	88815.199705	3584.800295
485	253600.0	112593.158423	141006.841577
3546	262100.0	308759.228390	-46659.228390
9792	387500.0	259686.369125	127813.630875
19483	100600.0	154545.166782	-53945.166782
12490	150000.0	135092.372787	14907.627213
9837	217100.0	166927.256708	50172.743292

In [76]:
```
# plotting predicted values
plt.plot(y, predict,'.')

# plot a line, a perfit predict would all fall on this line
x = np.linspace(0, 100,10)
y = x
plt.plot(x, y)
plt.show()
```



In [ ]:
```
```