```
#objective :predicting mean temperature using existing data from Dailydelhiclimate using machine learning

import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import TimeSeriesSplit
from sklearn.ensemble import RandomForestRegressor
from sklearn.metrics import mean_squared_error
testdata = pd.read_csv("/content/DailyDelhiClimateTest.csv",header=0)
testdata.head()
# here we display the first few rows of the dataset Dailydelhiclimate.
```

	date	meantemp	humidity	wind_speed	meanpressure
0	2017-01-01	15.913043	85.869565	2.743478	59.000000
1	2017-01-02	18.500000	77.222222	2.894444	1018.277778
2	2017-01-03	17.111111	81.888889	4.016667	1018.333333
3	2017-01-04	18.700000	70.050000	4.545000	1015.700000
4	2017-01-05	18.388889	74.944444	3.300000	1014.333333

```
testdata.shape
#the function returns tuple representing the number of rows and columns in the testData.
```

```
(114, 5)
```

```
traindata = pd.read_csv("/content/DailyDelhiClimateTrain.csv",header=0)
traindata.head()
```

	date	meantemp	humidity	wind_speed	meanpressure
0	2013-01-01	10.000000	84.500000	0.000000	1015.666667
1	2013-01-02	7.400000	92.000000	2.980000	1017.800000
2	2013-01-03	7.166667	87.000000	4.633333	1018.666667
3	2013-01-04	8.666667	71.333333	1.233333	1017.166667
4	2013-01-05	6.000000	86.833333	3.700000	1016.500000

```
traindata.shape
#the function returns tuple representing the number of rows and columns in the trainData.
```

```
(1462, 5)
```

```
traindata.describe()
#summary statistics of numerical columns
```

	meantemp	humidity	wind_speed	meanpressure
count	1462.000000	1462.000000	1462.000000	1462.000000
mean	25.495521	60.771702	6.802209	1011.104548
std	7.348103	16.769652	4.561602	180.231668
min	6.000000	13.428571	0.000000	-3.041667
25%	18.857143	50.375000	3.475000	1001.580357
50%	27.714286	62.625000	6.221667	1008.563492
75%	31.305804	72.218750	9.238235	1014.944901
max	38.714286	100.000000	42.220000	7679.333333

```
testdata.describe()
```

	meantemp	humidity	wind_speed	meanpressure
count	114.000000	114.000000	114.000000	114.000000
mean	21.713079	56.258362	8.143924	1004.035090
std	6.360072	19.068083	3.588049	89.474692
min	11.000000	17.750000	1.387500	59.000000
25%	16.437198	39.625000	5.563542	1007.437500
50%	19.875000	57.750000	8.069444	1012.739316
75%	27.705357	71.902778	10.068750	1016.739583
max	34.500000	95.833333	19.314286	1022.809524

```
traindata.isnull().sum()
#There is no missing values in both traindata and testdata
```

```
date            0
meantemp        0
humidity        0
wind_speed      0
meanpressure    0
dtype: int64
```

```
testdata.isnull().sum()
```

```
date            0
meantemp        0
humidity        0
wind_speed      0
meanpressure    0
dtype: int64
```

```
#Feature Engineering:
#Converting the 'date' column to datetime format and Extracting 'year', 'month', and 'day' from the 'date' column.
#Time Series Split:
#Splitting the training data using TimeSeriesSplit into 5 folds.
#Model Training:
for dataset in [traindata, testdata]:
    dataset['date'] = pd.to_datetime(dataset['date'])
    dataset['year'] = dataset['date'].dt.year
    dataset['month'] = dataset['date'].dt.month
    dataset['day'] = dataset['date'].dt.day

# Time Series Split
tscv = TimeSeriesSplit(n_splits=5)
for train_index, val_index in tscv.split(traindata):
    train_set, val_set = traindata.iloc[train_index], traindata.iloc[val_index]
```

```
features = ['year', 'month', 'day', 'humidity', 'wind_speed', 'meanpressure']

# Train Random Forest Regressor for Mean Temperature
X_train_temp, y_train_temp = train_set[features], train_set['meantemp']
X_val_temp, y_val_temp = val_set[features], val_set['meantemp']
model_temp = RandomForestRegressor(n_estimators=100, random_state=42)
model_temp.fit(X_train_temp, y_train_temp)
```

```
RandomForestRegressor
RandomForestRegressor(random_state=42)
```

```
X_train_humidity, y_train_humidity = train_set[features], train_set['humidity']
X_val_humidity, y_val_humidity = val_set[features], val_set['humidity']
model_humidity = RandomForestRegressor(n_estimators=100, random_state=42)
model_humidity.fit(X_train_humidity, y_train_humidity)
```

```
RandomForestRegressor
RandomForestRegressor(random_state=42)
```

```
#Train Random Forest Regressor for Wind Speed
X_train_wind, y_train_wind = train_set[features], train_set['wind_speed']
X_val_wind, y_val_wind = val_set[features], val_set['wind_speed']
model_wind = RandomForestRegressor(n_estimators=100, random_state=42)
model_wind.fit(X_train_wind, y_train_wind)
```

```
▾        RandomForestRegressor
RandomForestRegressor(random_state=42)
```

```
y_pred_temp = model_temp.predict(X_val_temp)
y_pred_humidity = model_humidity.predict(X_val_humidity)
y_pred_wind = model_wind.predict(X_val_wind)
```

```
mse_temp = mean_squared_error(y_val_temp, y_pred_temp)
mse_humidity = mean_squared_error(y_val_humidity, y_pred_humidity)
mse_wind = mean_squared_error(y_val_wind, y_pred_wind)

print(f'Mean Squared Error on Validation Set (Mean Temperature): {mse_temp}')
print(f'Mean Squared Error on Validation Set (Humidity): {mse_humidity}')
print(f'Mean Squared Error on Validation Set (Wind Speed): {mse_wind}')
#1.This means, on average, the squared difference between the predicted mean temperature values and the actual mean temperature values on th
#A higher MSE indicates larger deviations between the predicted and actual mean temperature values. In this case, an MSE of 5.4807 suggests
#mean temp is my main focus
```

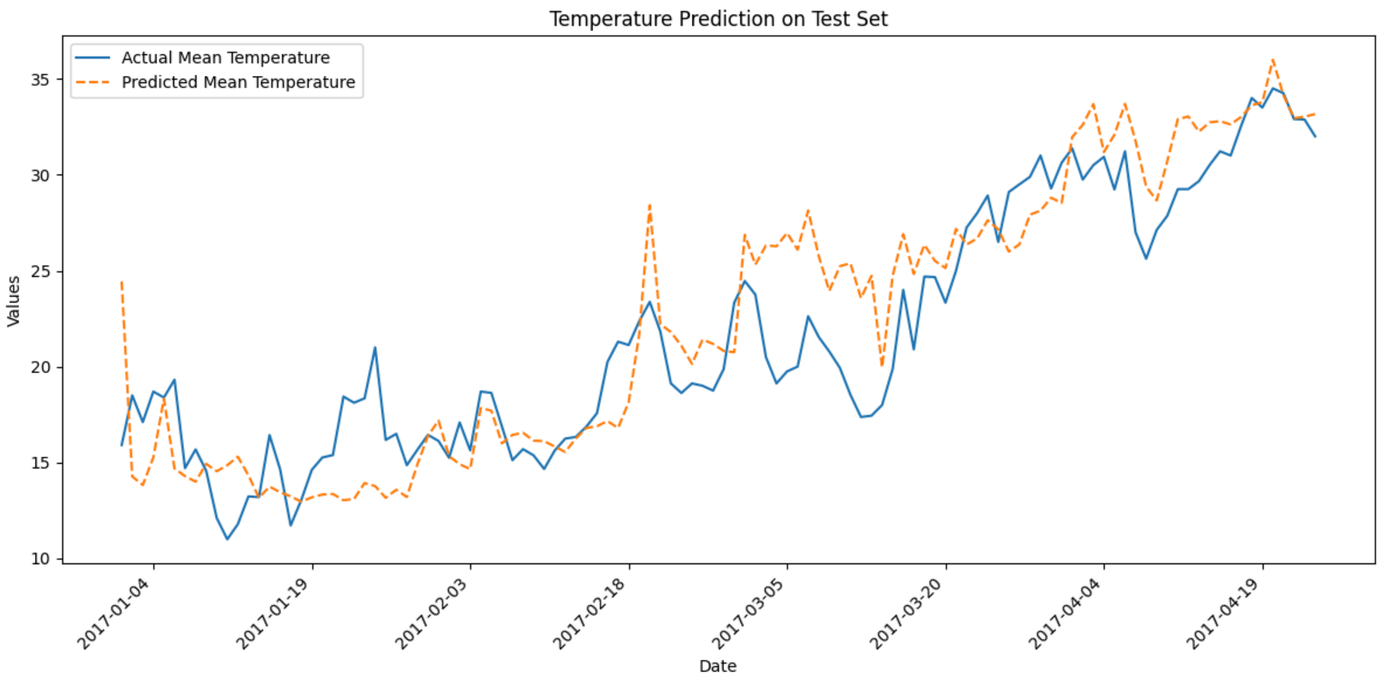
```
Mean Squared Error on Validation Set (Mean Temperature): 5.480743862871555
Mean Squared Error on Validation Set (Humidity): 0.04361086002605141
Mean Squared Error on Validation Set (Wind Speed): 0.0016501579434270843
```

```
X_test = testdata[features]

# Make predictions on the test sets
testdata['predicted_meantemp'] = model_temp.predict(X_test)
testdata['predicted_humidity'] = model_humidity.predict(X_test)
testdata['predicted_wind_speed'] = model_wind.predict(X_test)
```

```
plt.figure(figsize=(12, 6))
plt.plot(testdata['date'], testdata['meantemp'], label='Actual Mean Temperature')
plt.plot(testdata['date'], testdata['predicted_meantemp'], label='Predicted Mean Temperature', linestyle='dashed')
plt.xticks(rotation=45, ha='right')
plt.gca().xaxis.set_major_locator(plt.MaxNLocator(prune='both'))
plt.gca().xaxis.set_major_formatter(plt.matplotlib.dates.DateFormatter('%Y-%m-%d'))

plt.title('Temperature Prediction on Test Set')
plt.xlabel('Date')
plt.ylabel('Values')
plt.legend()
plt.tight_layout()
plt.show()
#Temperature Prediction plot  is shown below with  predicted mean temp coming out high around 18th february  to 20th march  and some days of
#hence in conclusion predicted mean temp  and actual mean temp increase and decrease trend is evident.
```


Temperature Prediction on Test Set
Actual Mean Temperature
Predicted Mean Temperature
Values
Date
2017-01-04
2017-01-19
2017-02-03
2017-02-18
2017-03-05
2017-03-20
2017-04-04
2017-04-19
10
15
20
25
30
35