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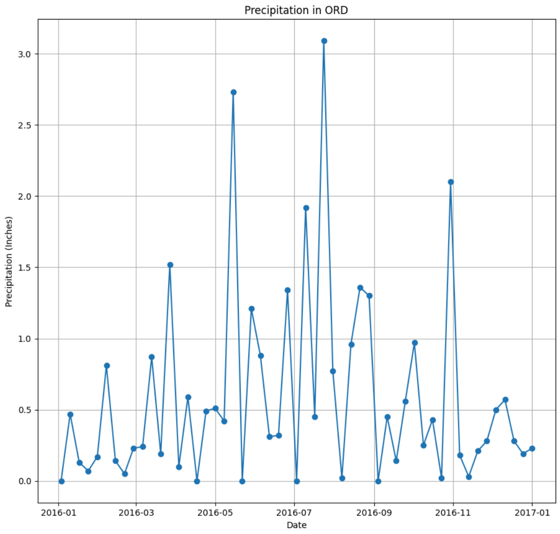
# https://github.com/lloydalexporter/UChicago_MS_ADS_Supplement

#!> Import libraries
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
from time import sleep
from pprint import pprint

# *** CONSTANTS
CSV_FILE_PATH = "weather.csv" # Path to the input CSV file https://corgis-edu.github.io/corgis/csv/weather/
STATION_CODE = "ORD"          # Weather station code for Chicago ;)

# !> Visualise data
def graph_precipitation(data):
 plt.figure(figsize=(10,5))
 plt.plot(data['Date.Full'], data['Data.Precipitation'], marker='o', linestyle='-')
 plt.title(f'Precipitation in {STATION_CODE}')
 plt.xlabel('Date')
 plt.ylabel('Precipitation (Inches)')
 plt.grid(True)
 plt.show()

# !> Use your function for data analysis
def analyse_station_data(station_data):
 print(f"\nAnalysis for Station: {STATION_CODE}")
 num_days = len(station_data)
 total_precipitation = station_data['Data.Precipitation'].sum()
 avg_precipitation = station_data['Data.Precipitation'].mean()
 max_precipitation = station_data['Data.Precipitation'].max()
 min_precipitation = station_data['Data.Precipitation'].min()
 avg_temp = station_data['Data.Temperature.Avg Temp'].mean()
 max_temp = station_data['Data.Temperature.Max Temp'].max()
 min_temp = station_data['Data.Temperature.Min Temp'].min()
 print(f"Total Precipitation: {total_precipitation:.2f} inches over {num_days} days")
 print(f"Max ({max_precipitation:.2f}) | Avg ({avg_precipitation:.2f}) | Min ({min_precipitation:.2f}) Precipitation")
 print("Temperature Analysis (*F):")
 print(f"Max ({max_temp:.2f}) | Avg ({avg_temp:.2f}) | Min ({min_temp:.2f})")
```



```
def preview_table(data, num_rows=5):
 print(f'\n' * 3)
 pprint(data.head(num_rows))
 print(data.dtypes)


# !> Manage different data types
def process_csv(raw_data):
 # Format the dates and separate into components
 raw_data["Date.Full"] = pd.to_datetime(raw_data["Date.Full"])
 raw_data["Date.Month"] = raw_data["Date.Full"].dt.month
 raw_data["Date.Day"] = raw_data["Date.Full"].dt.day
 raw_data["Date.Year"] = raw_data["Date.Full"].dt.year
 return raw_data
```

```
def main():

 # !> Ingest data from CSV
 raw_data = pd.read_csv(CSV_FILE_PATH)
 headers = raw_data.columns.tolist()
 preview_table(raw_data)
 # !> Manage different data types
 processed_data = process_csv(raw_data)
 preview_table(processed_data)
 # !> Wrangle data
 station_data = processed_data[processed_data['Station.Code'] == STATION_CODE].copy()
 group_columns = ['Date.Full','Station.Code','Station.Location']
 aggregate = {
   'Data.Precipitation': 'sum',
   'Data.Temperature.Avg Temp': 'mean',
   'Data.Temperature.Max Temp': 'max',
   'Data.Temperature.Min Temp': 'min'
 }
 station_data = station_data.groupby(group_columns).agg(aggregate).reset_index()

 preview_table(station_data)
 analyse_station_data(station_data)
 graph_precipitation(station_data)

if __name__ == "__main__":
 main()
```

Output

```
Date.Full Station.Code Station.Location  Data.Precipitation  Data.Temperature.Avg Temp
Data.Temperature.Max Temp  Data.Temperature.Min Temp
0 2016-01-03          ORD      Chicago, IL                0.00                       25.0
30                         20
1 2016-01-10          ORD      Chicago, IL                0.47                       29.0
35                         22
2 2016-01-17          ORD      Chicago, IL                0.13                       21.0
27                          8
3 2016-01-24          ORD      Chicago, IL                0.07                       18.0
24                         11
4 2016-01-31          ORD      Chicago, IL                0.17                       33.0
39                         26
Date.Full                    datetime64[ns]
Station.Code                         object
Station.Location                     object
Data.Precipitation                  float64
Data.Temperature.Avg Temp           float64
Data.Temperature.Max Temp             int64
Data.Temperature.Min Temp             int64
dtype: object

Analysis for Station: ORD
Total Precipitation: 31.05 inches over 53 days
Max (3.09) | Avg (0.59) | Min (0.00) Precipitation
Temperature Analysis (*F):
Max (90.00) | Avg (51.43) | Min (4.00)
```