laba_6

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1.1 K13; V-101

1.2 Version of:

Pandas - 1.5.3;

matplotlib- 3.6.3

P=6

1.2.1 TASK_0

(Cleaning data)

[1]:
```
import pandas as pd
import matplotlib as mpl
import matplotlib.pyplot as plt
import numpy as np
```

[2]:
```
path = "weather.csv"
df = pd.read_csv(path, names=('d', 'cl', 'precip',
                              'D.t', 'N.t',
                  'W.pow', 'per'), header=0)

df.replace('-', np.nan, inplace=True)
```

[3]:
```
df['cl'] = df['cl'].str.replace('%', '', regex=False).astype(int)

df['precip'] = df['precip'].str.replace(' . .', '', regex=False)
df['precip'] = pd.to_numeric(df['precip'], errors='coerce', downcast='unsigned')
df['precip'] =df['precip'].astype(pd.Int64Dtype())

df['D.t'] = df['D.t'].astype(str)
df['D.t'] = df['D.t'].str.replace('°C', '').astype(float)

df['N.t'] = df['N.t'].astype(str)
df['N.t'] = df['N.t'].str.replace('°C', '').astype(float)
```

```
df['W.pow'] = df['W.pow'].str.replace(' / ', '', regex=False).astype(int)
```

[4]:
```
df['per'] = pd.to_datetime(df['per'])
df['m'] = df['per'].dt.month
df.groupby('m')
df
```

[4]:

	d	cl	precip	D.t	N.t	W.pow	per	m
0	1	72	<NA>	13.5	6.0	4	2023-04-01	4
1	2	100	1	8.0	8.5	3	2023-04-01	4
2	3	100	2	6.0	6.0	4	2023-04-01	4
3	4	100	<NA>	5.0	2.0	3	2023-04-01	4
4	5	87	4	7.5	3.0	5	2023-04-01	4
..	..	…	…	…	…	…	..	
360	27	64	1	19.5	13.0	6	2022-05-01	5
361	28	39	<NA>	17.0	10.0	4	2022-05-01	5
362	29	38	<NA>	18.5	10.5	3	2022-05-01	5
363	30	86	4	15.5	12.5	4	2022-05-01	5
364	31	39	<NA>	17.0	13.5	3	2022-05-01	5

[365 rows x 8 columns]

1.2.2 TASK_1

For period P, plot line graphs of changes in daytime temperature, night temperature, cloudiness, and wind strength by day

[5]:
```
P =(df['m'] == 6)
```

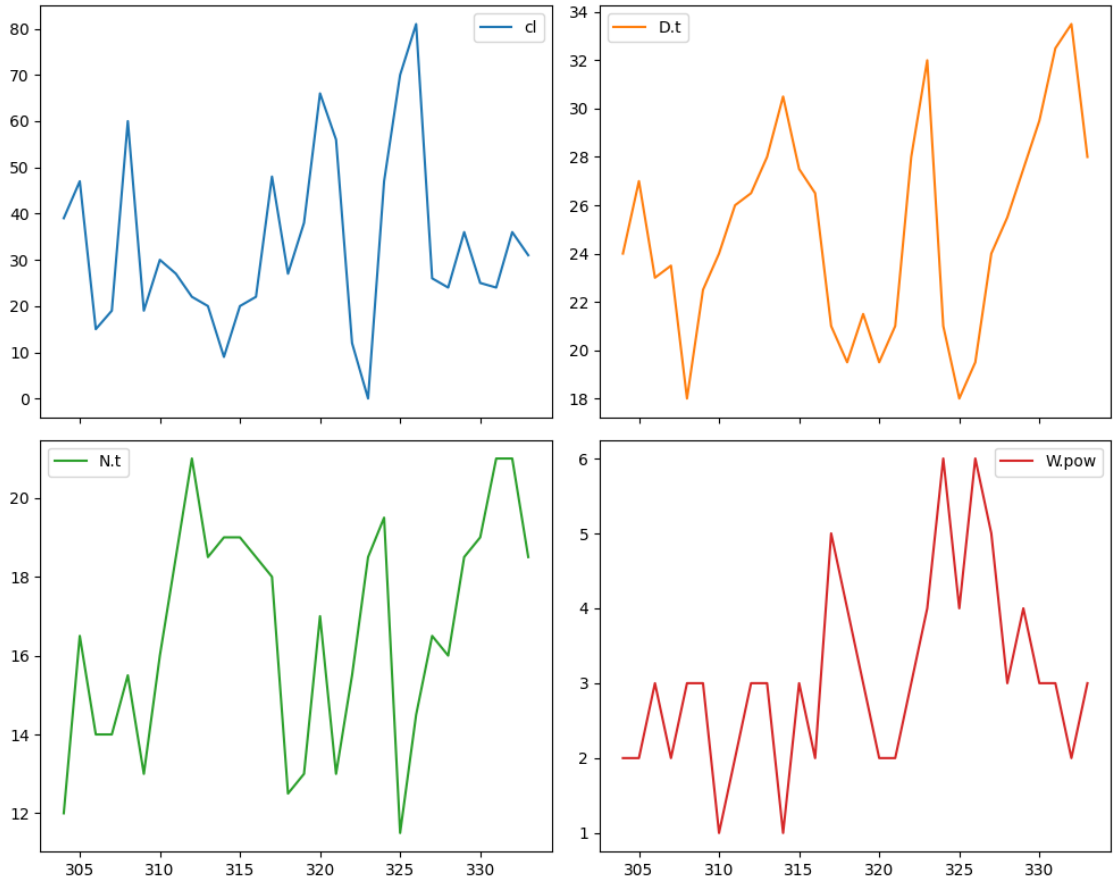
[6]:
```
gr1=df.loc[P, ['cl', 'D.t', 'N.t', 'W.pow']]
gr1
```

[6]:

	cl	D.t	N.t	W.pow
304	39	24.0	12.0	2
305	47	27.0	16.5	2
306	15	23.0	14.0	3
307	19	23.5	14.0	2
308	60	18.0	15.5	3
309	19	22.5	13.0	3
310	30	24.0	16.0	1
311	27	26.0	18.5	2
312	22	26.5	21.0	3
313	20	28.0	18.5	3
314	9	30.5	19.0	1
315	20	27.5	19.0	3
316	22	26.5	18.5	2
317	48	21.0	18.0	5
318	27	19.5	12.5	4

```
319   38   21.5   13.0      3
320   66   19.5   17.0      2
321   56   21.0   13.0      2
322   12   28.0   15.5      3
323    0   32.0   18.5      4
324   47   21.0   19.5      6
325   70   18.0   11.5      4
326   81   19.5   14.5      6
327   26   24.0   16.5      5
328   24   25.5   16.0      3
329   36   27.5   18.5      4
330   25   29.5   19.0      3
331   24   32.5   21.0      3
332   36   33.5   21.0      2
333   31   28.0   18.5      3
```

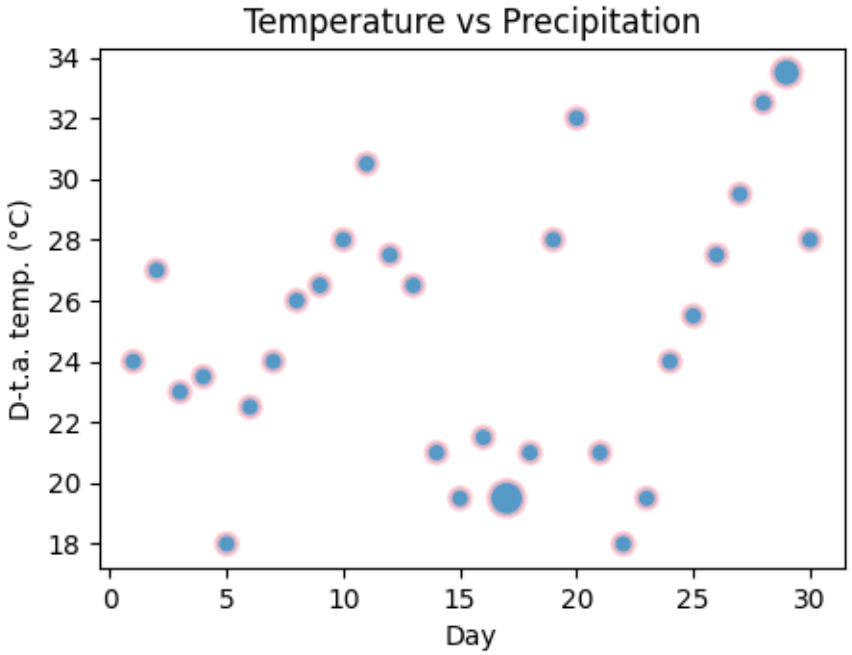
[7]:
```
gr1.plot(kind='line', subplots=True, layout=(2, 2), figsize=(10, 8))
plt.tight_layout()
```



1.2.3 TASK_2

The bubble (scatter) graph of daily temperature

[8]:
```
data = df[P]

x = data['d']
y = data['D.t']
sizes = data['precip'].fillna(1)

sizes = [10 if pd.isna(precipitation) else precipitation * 60 for precipitation␣
 ↪in sizes]

plt.figure(figsize=(5, 3.5))
plt.scatter(x, y, s=sizes, alpha=0.75, edgecolor='pink', linewidth=2)

plt.xlabel('Day')
plt.ylabel('D-t.a. temp. (°C)')
plt.title('Temperature vs Precipitation')

plt.show()
```



1.2.4 TASK_3

Find the monthly average deviation of night temperature from daytime

[9]:
```
df['dev'] = df['D.t'] - df['N.t']

monthly_avg_deviation = df.groupby('m')['dev'].mean()
monthly_avg_deviation
```

[9]:
```
m
1     2.467742
2     3.089286
3     4.693548
4     4.350000
5     7.451613
6     8.316667
7     8.661290
8     9.403226
9     5.416667
10    5.048387
11    3.200000
12    2.596774
Name: dev, dtype: float64
```

1.2.5 TASK_4

The biggest discrepancy between day and night temperatures

[10]:
```
larg_values = df.groupby('m', group_keys=False)['dev'].apply(lambda x: x.abs()).
↪max()
largest_deviation = df.loc[df['dev'].abs() == larg_values]
largest_deviation
```

[10]:

	d	cl	precip	D.t	N.t	W.pow	per	m	dev
267	26	9	<NA>	36.5	20.5	4	2022-08-01	8	16.0

1.2.6 TASK_5

4 windiest days in period P

[11]:
```
windiest_days = df[P].nlargest(4, 'W.pow')
windiest_days
```

[11]:

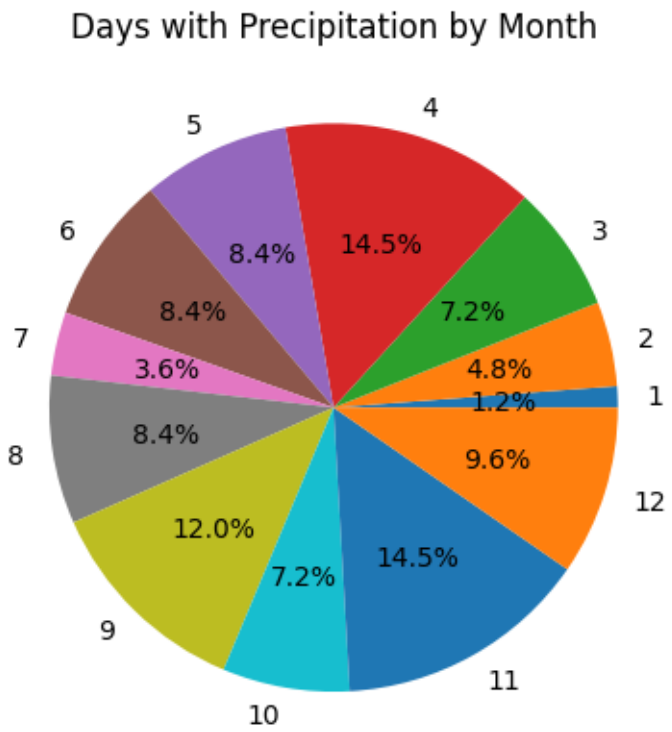
	d	cl	precip	D.t	N.t	W.pow	per	m	dev
324	21	47	1	21.0	19.5	6	2022-06-01	6	1.5
326	23	81	<NA>	19.5	14.5	6	2022-06-01	6	5.0
317	14	48	1	21.0	18.0	5	2022-06-01	6	3.0
327	24	26	<NA>	24.0	16.5	5	2022-06-01	6	7.5

1.2.7 TASK_6

The number of days with precipitation in the month

[12]:
```
precip_days = df[df['precip'].notna()].groupby('m')['d'].count()

plt.pie(precip_days, labels=precip_days.index, autopct='%.1f%%')
plt.title('Days with Precipitation by Month')
```

[12]:
```
Text(0.5, 1.0, 'Days with Precipitation by Month')
```



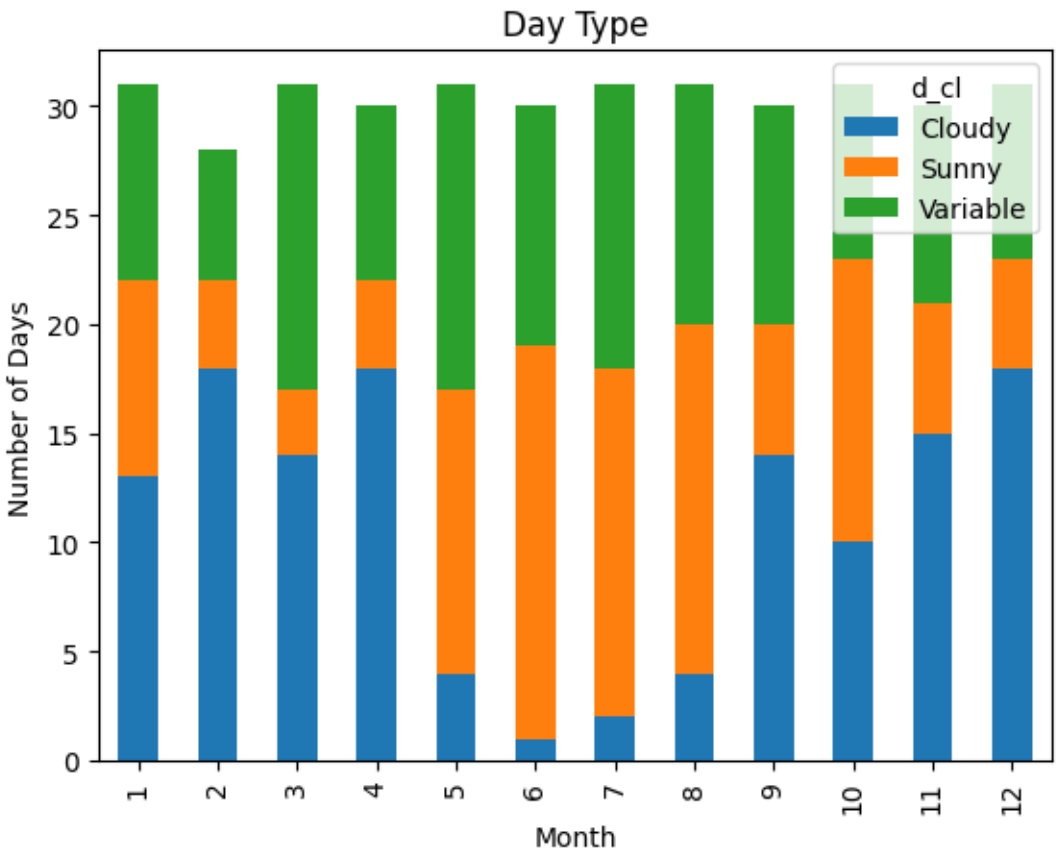
1.2.8 TASK_7

loudiness

[13]:
```
def day_type(cloudiness):
    if cloudiness > 70:
        return 'Cloudy'
    elif cloudiness < 35:
        return 'Sunny'
    else:
        return 'Variable'

df['d_cl'] = df['cl'].apply(day_type)

grouped_data = df.groupby(['m', 'd_cl']).size().unstack(fill_value=0)
```

```
grouped_data.plot(kind='bar', stacked=True)

plt.xlabel('Month')
plt.ylabel('Number of Days')
plt.title('Day Type')
```

[13]: `Text(0.5, 1.0, 'Day Type')`



1.2.9 TASK_8

All the months in which there were more sunny days than days with precipitation

[14]:
```
n_sunny = df.groupby('m')['cl'].apply(lambda x: (x < 35).sum())
n_perc = df.groupby('m')['precip'].count()

sunny_months = n_sunny[n_sunny > n_perc].index
print('Lucky sunny days:)')
print(*sunny_months, sep=',\n')
```

```
Lucky sunny days:)
1,
5,
6,
7,
8,
10
```

1.2.10 TASK_9

Histogram of the deviation of night temperature from daytime

[15]:
```
plt.hist(df['dev'], bins=40)
plt.xlabel('Deviation (°C)')
plt.ylabel('Frequency')
plt.title('Temperature Deviation')
```

[15]:
```
Text(0.5, 1.0, 'Temperature Deviation')
```