

Exploratory Data Analysis

Understanding your data

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Exploratory Data Analysis

- Understanding data
- Spotting patterns & relations
- Machine Learning “Preconditions”

Jupyter notebooks

- Interactive (python) shell
- Code, story & charts

This is a markdown cell used for documentation

The above cell was written as: "### This is a markdown cell", followed by Shift+Enter

```
In [12]: import math
print "This is a code cell... and Pi is = ", math.pi

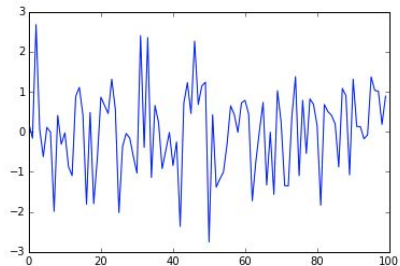
This is a code cell... and Pi is =  3.14159265359
```

```
In [13]: # to enable inline graphs, etc.
%pylab inline

plot(randn(100))
```

Populating the interactive namespace from numpy and matplotlib

```
Out[13]: [<matplotlib.lines.Line2D at 0x7fe2a2496cd0>]
```



Pandas - Data processing

[Pandas cheat sheet](#)

- Load, show data
- Concat, join dataframes
- Filter, sort rows
- Summarize data
- Apply functions, calculations
- Create/drop columns
- Group by, aggregate

Pandas - Data processing

```
In [1]: import pandas as pd

        from matplotlib import pyplot as plt
        %matplotlib inline
```

First we load the weather data:

```
In [2]: df_weather = pd.read_csv('weather.csv', index_col='Date', parse_dates=['Date'])
        df_weather.head()
```

```
Out[2]:
```

	Max_Temperature_F	Mean_Temperature_F	Min_TemperatureF	Max_Dew_Point_F	MeanDew_Point_F	Mi
Date						
2014-10-13	71	62.0	54	55	51	46
2014-10-14	63	59.0	55	52	51	50
2014-10-15	62	58.0	54	53	50	46
2014-10-16	71	61.0	52	49	46	42
2014-10-17	64	60.0	57	55	51	41

Pandas - Data processing

```
In [6]: df['Mean_Temperature_F'].count()
```

```
Out[6]: 688
```

```
In [7]: df['Mean_Temperature_F'].min()
```

```
Out[7]: 33.0
```

```
In [8]: df['Mean_Temperature_F'].max()
```

```
Out[8]: 83.0
```

```
In [9]: df['Mean_Temperature_F'].describe()
```

```
Out[9]: count      688.000000  
mean        56.584302  
std         10.408058  
min         33.000000  
25%         48.000000  
50%         56.000000  
75%         65.000000  
max         83.000000  
Name: Mean_Temperature_F, dtype: float64
```

Pandas - Data processing

```
In [8]: df['Month'] = df.index.map(lambda x: x.month)
```

```
quarters = { 1: 'Q1', 2: 'Q1', 3: 'Q1', 4: 'Q2', 5: 'Q2', 6: 'Q2',  
             7: 'Q3', 8: 'Q3', 9: 'Q3', 10: 'Q4', 11: 'Q4', 12: 'Q4' }
```

```
df['Quarter'] = df['Month'].apply(lambda x: quarters[x])
```


Pandas - Data processing

```
In [11]: df[df['Quarter'] == 'Q1']['Precipitation_In'].mean()
```

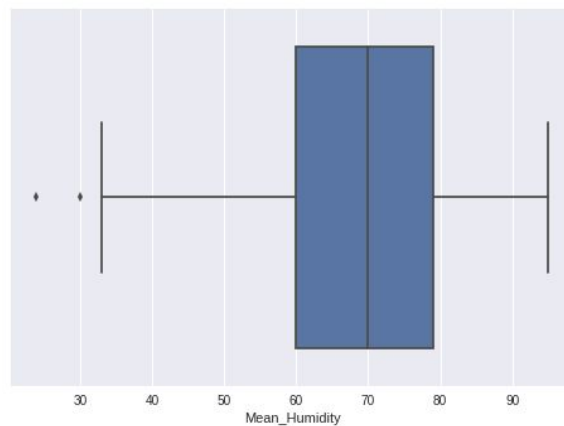
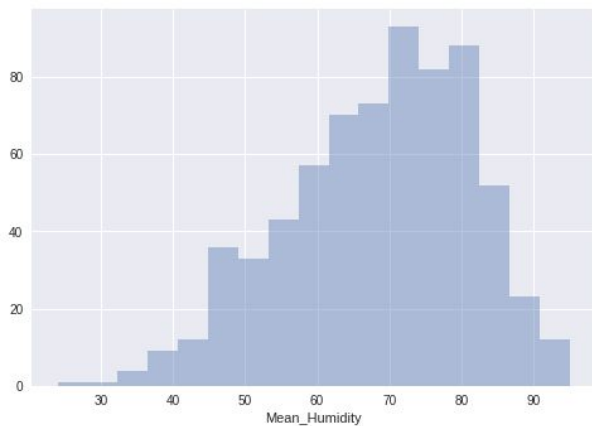
```
Out[11]: 0.1559668508287293
```

```
In [12]: df[df['Quarter'] == 'Q4'].groupby('Month')['Mean_Temperature_F'].mean()
```

```
Out[12]: Month
10      58.840000
11      46.800000
12      45.709677
Name: Mean_Temperature_F, dtype: float64
```

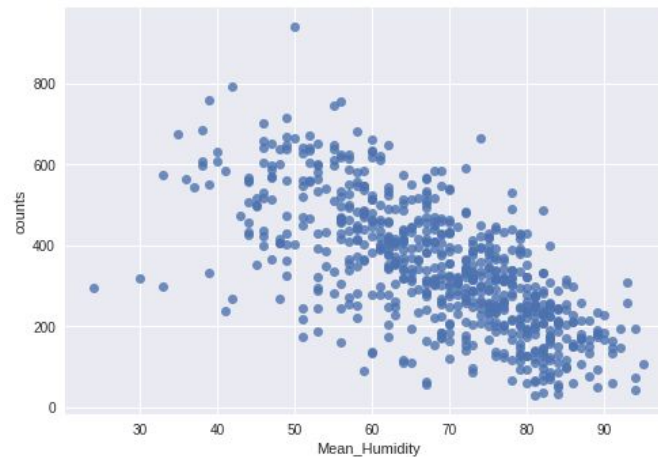
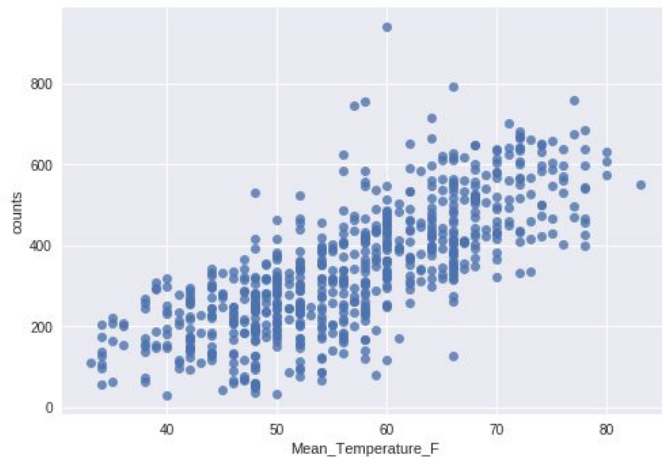
Seaborn - Data Visualization

- Plot one variable
 - Histogram & boxplot



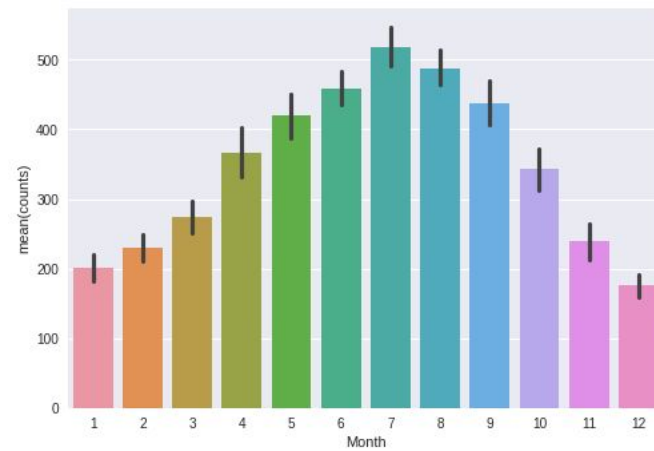
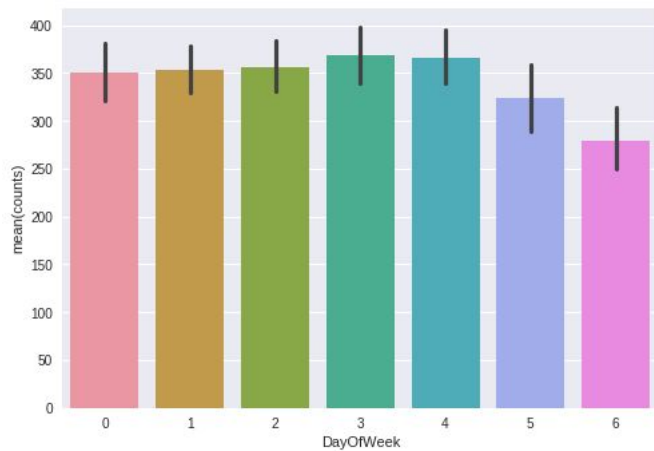
Seaborn - Data Visualization

- Plot relations between (numerical) variables
 - Scatterplot



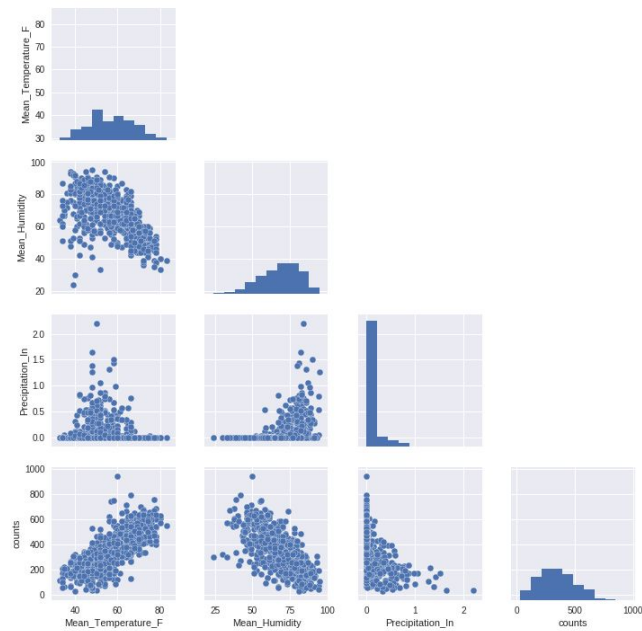
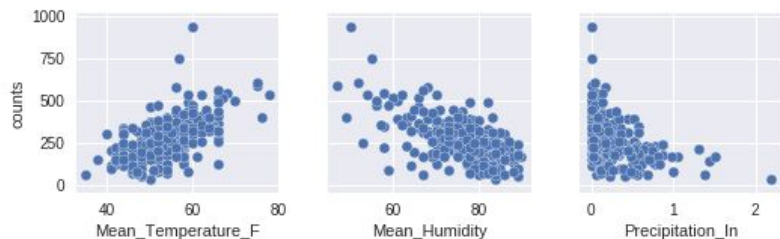
Seaborn - Data Visualization

- Plot relations between (categorical) variables
 - Barplot & boxplot



Seaborn - Data Visualization

- Pairplot - plot many relations



Example

- [Data Analysis Titanic Survivors](#)

Hackathon goals

- Understand the data
- Find some research questions / hypotheses
- See if data supports your ideas

Questions ?

- Let's start hacking !