Python for scientific research

Data visualisation with `seaborn`

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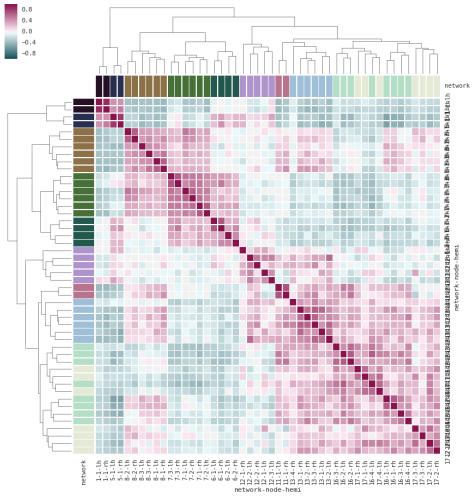
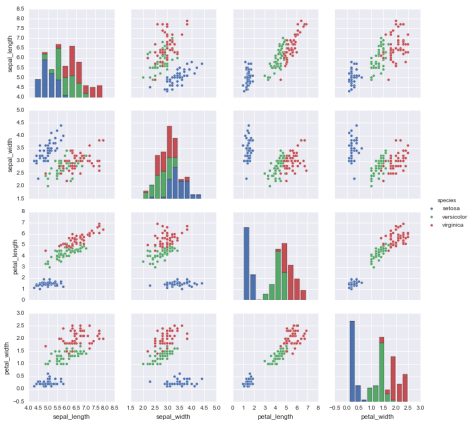
What we've done so far

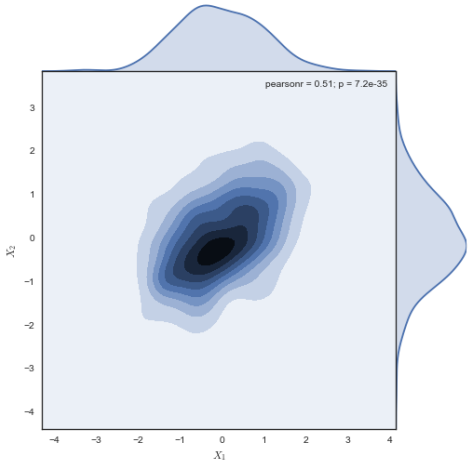
1. Declare variables using built-in data types and execute operations on them
2. Use flow control commands to dictate the order in which commands are run and when
3. Encapsulate programs into reusable functions, modules and packages
4. Use string manipulation and regex to work with textual data
5. Interact with the file system
6. Number crunching using `NumPy/SciPy`
7. Publication-ready graphs with `Matplotlib`
8. Working with data using `pandas`
9. **Next**: Introducing `Seaborn`, an advanced plotting library

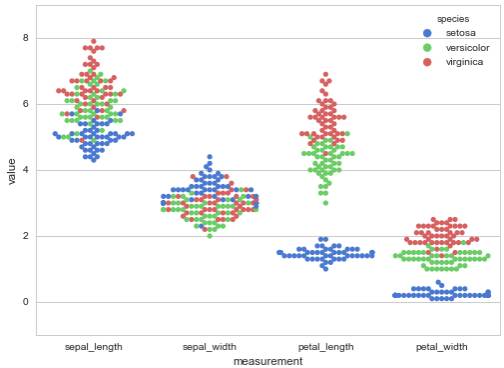
Introduction

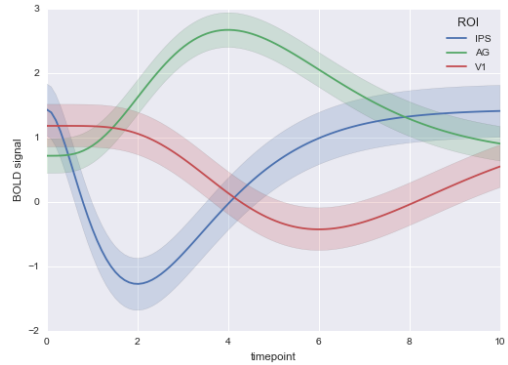
- `Seaborn` is a library built on top of `Matplotlib` for making attractive and informative statistical graphics
- It supports `Numpy` and `Pandas` data structures











Reading data files: Wine

```
1 import pandas as pd
2
3 # Chemical analysis of wines grown in the same region in
      Italy but
4 # from three different cultivars
5 df = pd.read_csv("wine.csv", header=0)
6 df.head()
```

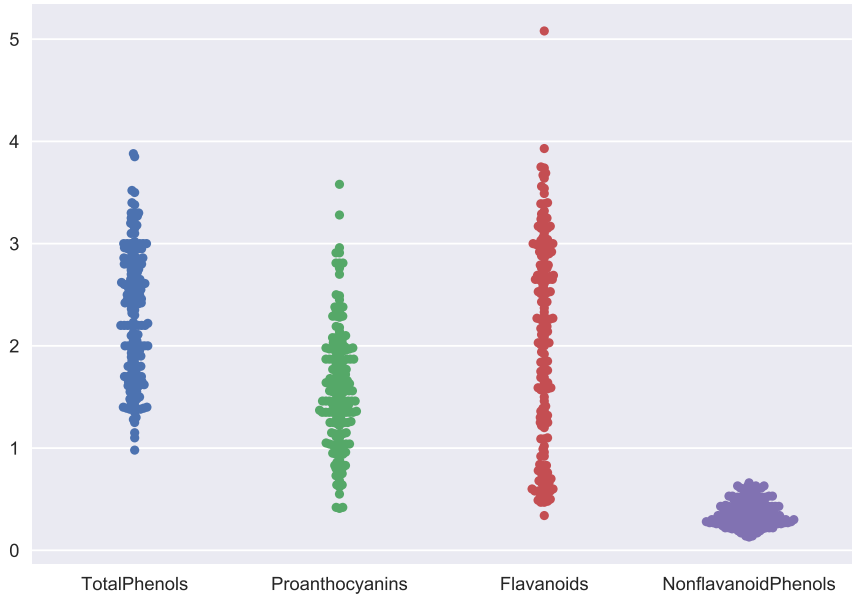
```
  WineType  Alcohol  MalicAcid   Ash  AlcalinityAsh   Magnesium  \
0        A    14.23       1.71  2.43           15.6         127
1        A    13.20       1.78  2.14           11.2         100
2        A    13.16       2.36  2.67           18.6         101
3        A    14.37       1.95  2.50           16.8         113
4        A    13.24       2.59  2.87           21.0         118

   TotalPhenols   Flavanoids  NonflavanoidPhenols   Proanthocyanins   \
0          2.80         3.06                 0.28              2.29
1          2.65         2.76                 0.26              1.28
2          2.80         3.24                 0.30              2.81
3          3.85         3.49                 0.24              2.18
4          2.80         2.69                 0.39              1.82

   ColorIntensity  Hue   OD280_OD315  Proline
0            5.64  1.04         3.92     1065
1            4.38  1.05         3.40     1050
2            5.68  1.03         3.17     1185
3            7.80  0.86         3.45     1480
4            4.32  1.04         2.93      735
```

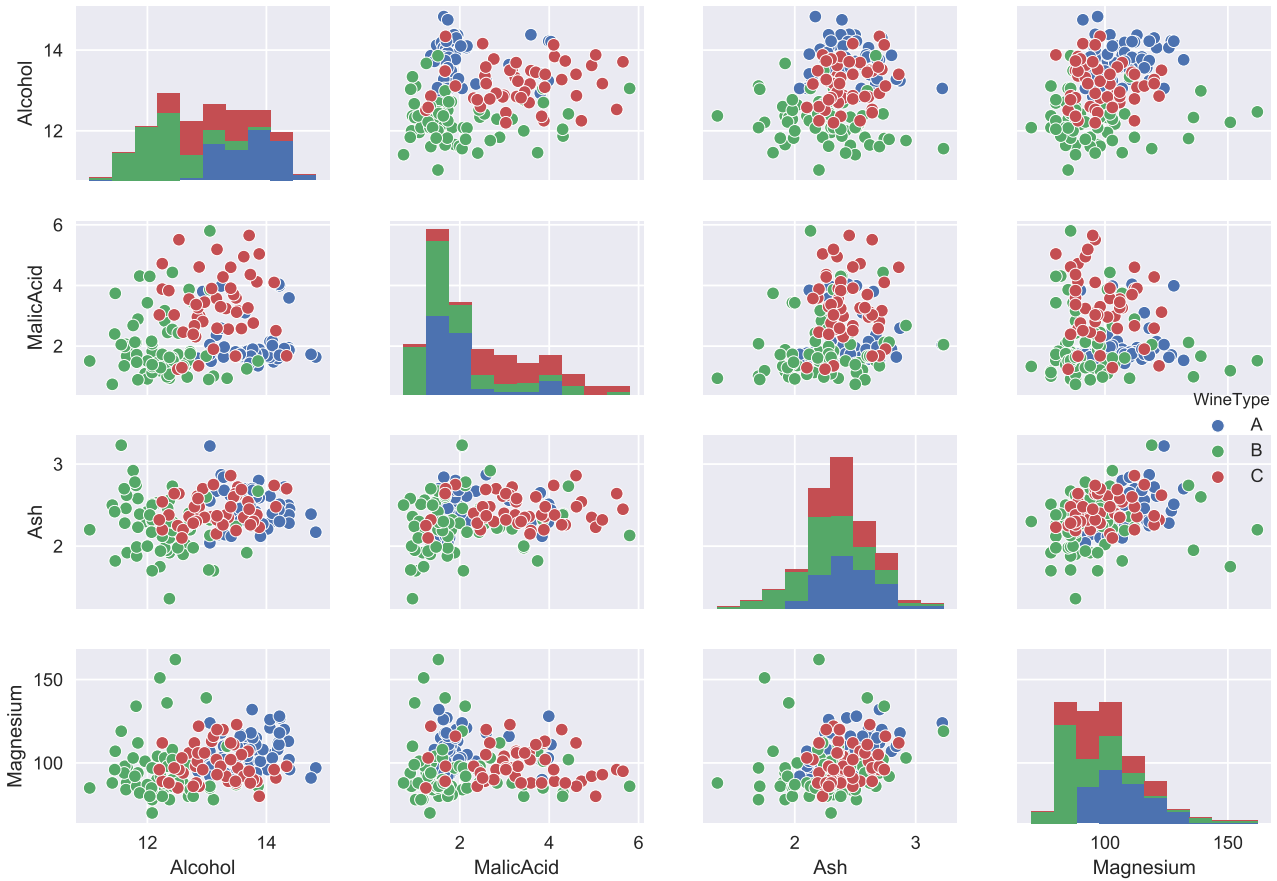
Beeswarm

```
1 import seaborn as sns
2
3 # Pick some chemicals
4 df = df[["TotalPhenols", "Proanthocyanins", "Flavanoids", "
      NonflavanoidPhenols"]]
5
6 # Beeswarm plot
7 sns.swarmplot(data=df)
```



Pairplot

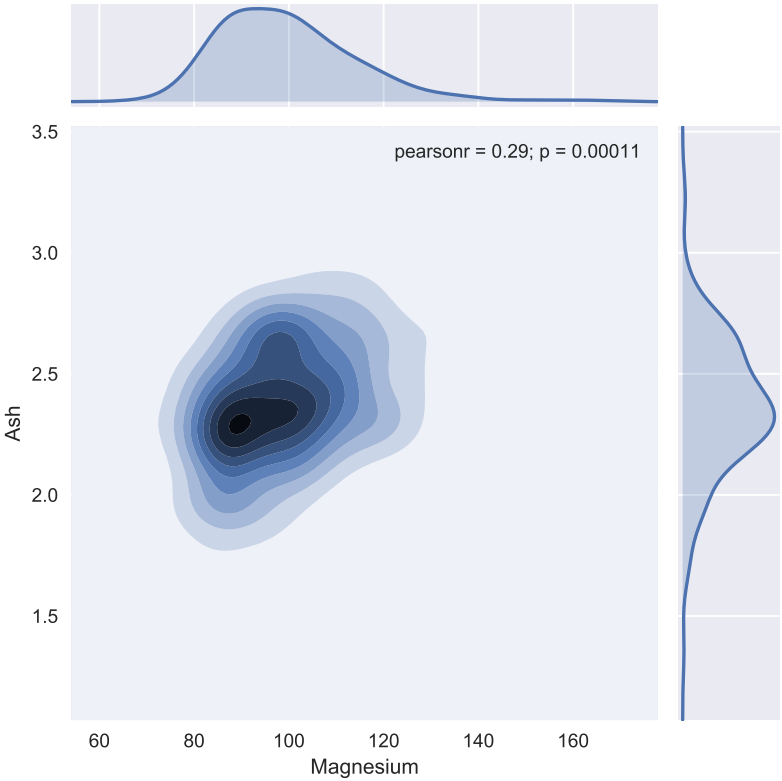
```
1 sns.pairplot(df,
2                  vars=["Alcohol", "MalicAcid", "Ash", "Magnesium
                       "],
3                  hue="WineType")
```



Jointplot

```
# Smoothed bivariate histogram
sns.jointplot(x="Magnesium", y="Ash", data=df, kind="kde")

# Linear regression
sns.jointplot(x="Magnesium", y="Ash", data=df, kind="reg")
```



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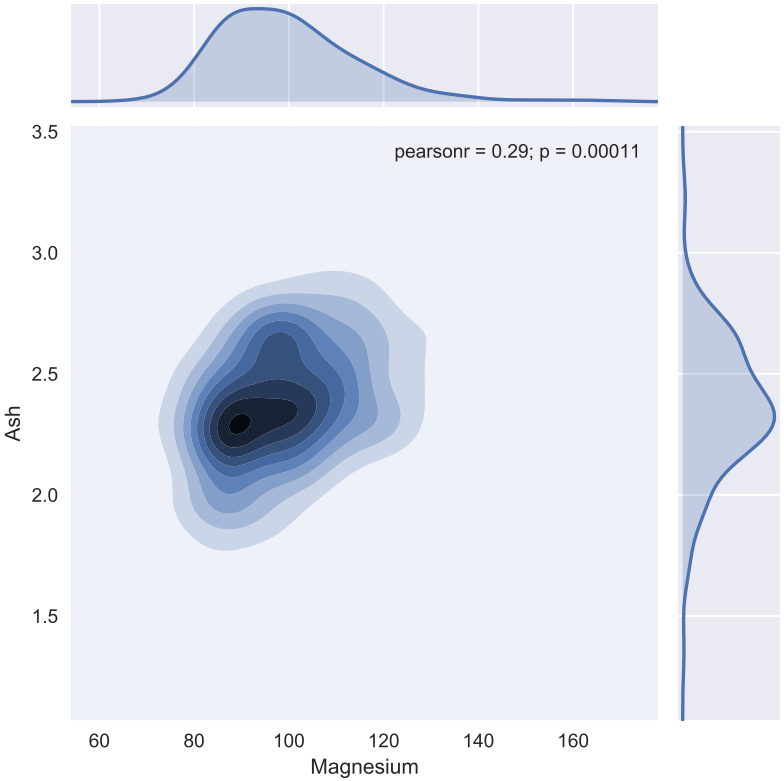

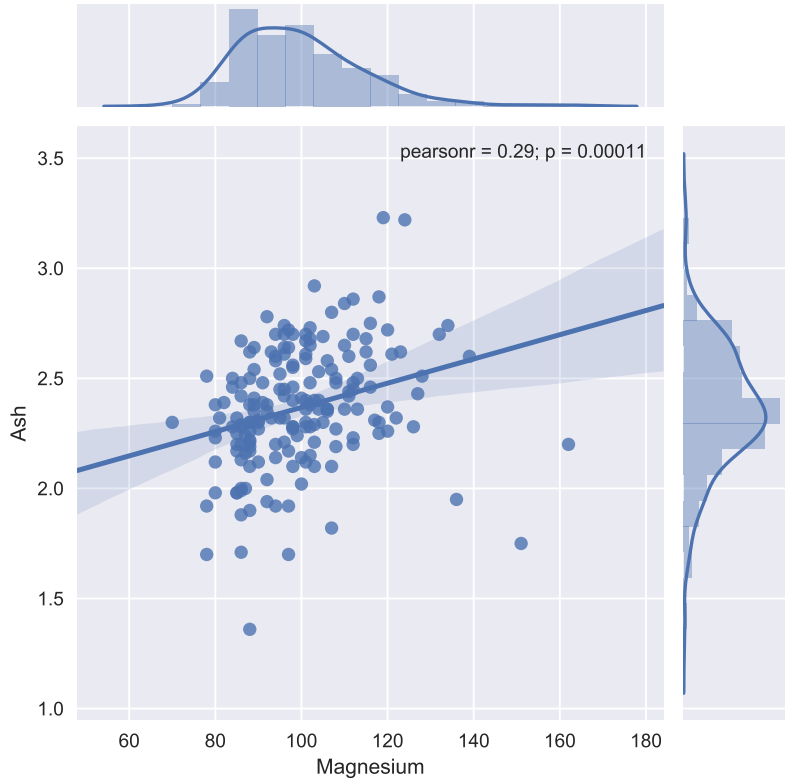

Clustermap

```
# Remove WineType (we only want a heatmap of numerical
    variables)
hAx = sns.clustermap(df.drop(["WineType"], axis=1),
                     z_score=1, row_colors=rowCol)

# Remove row labels
plt.setp(hAx.ax_heatmap, yticklabels=[])
```