

**1 Opening**

- pandas
- as spreadsheet
- relational database
- application

**2 pandas.ipynb part**

- Numpy and Pandas
- Python. duck typing. if something looks like sequence and acts like a sequence. iteration over, length
- numpy array was not designed. numpy functions implemented in C.
- base Python is not well designed for data science
- floats by default unless otherwise told
- numpy array 8-byte cells adjacent
- numpy is vectorized.
- adding a list to a list will concatenate in base Python. numpy is vectorized elementwise numerical summation.
- Data Science from Scratch
- Joel Grus - Livecoding Madness - Let's Build a Deep Learning Library
- "\*" is elementwise, np.dot is matrix multiplication