ML Seminar

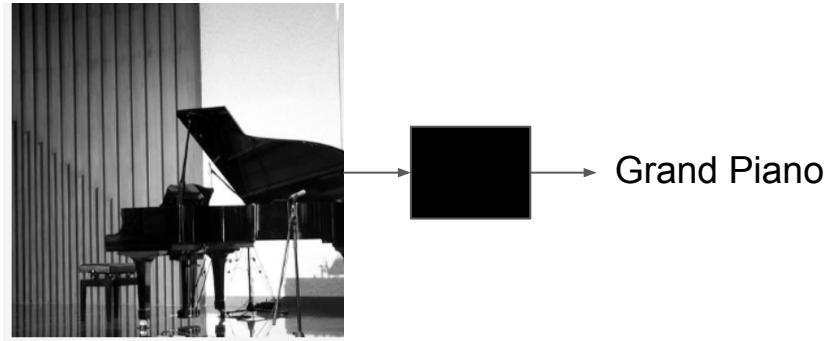
Meeting 1: Introduction, Python Environment, Data formats

What is this?

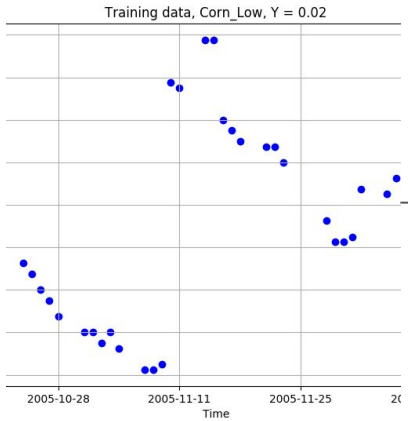
- Seminar with focus on AI!
  - **Supervised learning**
  - Reinforcement learning
  - Generative models
- Meeting 1 - 2 times a week
- Slides + Hands-on
- Goal: benefit our research more with AI

Learn by example: supervised learning

From example inputs and corresponding outputs, extract function that relates them.



Grand Piano



Price increase

https://transcranial.github.io/keras-js/

Learn by example: supervised learning

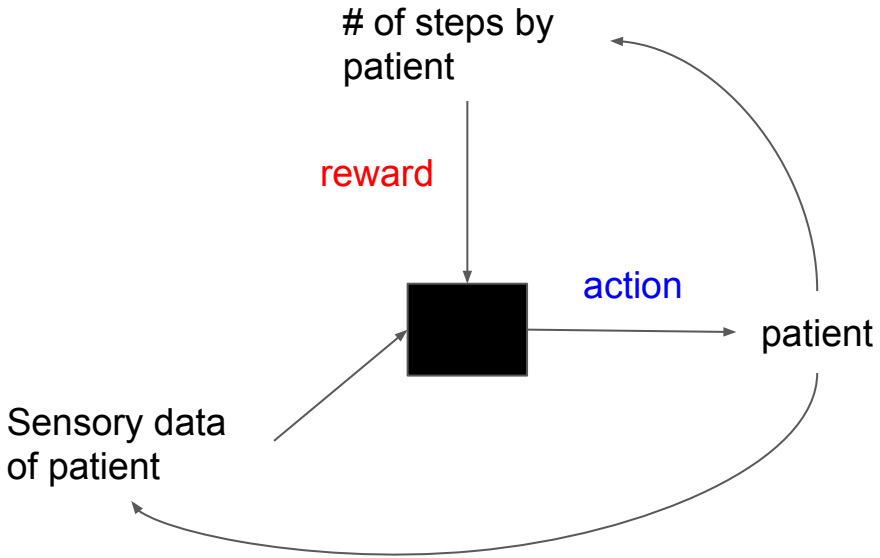
Useful when:

- Outputs are expensive to obtain, eg. patient survival chances
- Outputs need to be obtained *very fast* (in some ms), eg high frequency trading
- Insights into relationship are interesting

Learn by feedback: reinforcement learning

Optimize reward function

https://www.youtube.com/watch?v=V1eYniJ0Rnk



Greenewald, Kristjan, et al. "Action Centered Contextual Bandits." *Advances in neural information processing systems*. 2017.

Learn by feedback: reinforcement learning

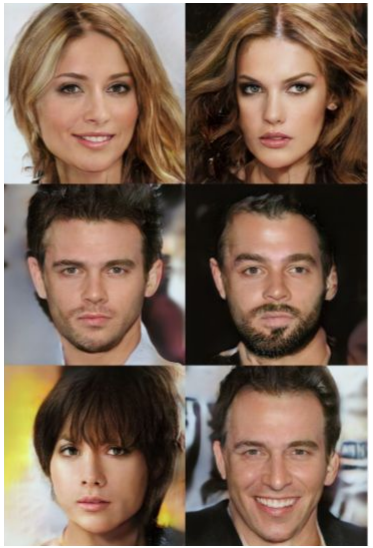
Useful when:

- Automatization of some process is useful
- Outputs need to be obtained *very fast* (in some ms), eg high frequency trading

Generate by example: GANs

Learn to sample from distribution.

https://arxiv.org/pdf/1710.10916.pdf



http://research.nvidia.com/sites/default/files/publications/karras2017gan-paper-v2.pdf

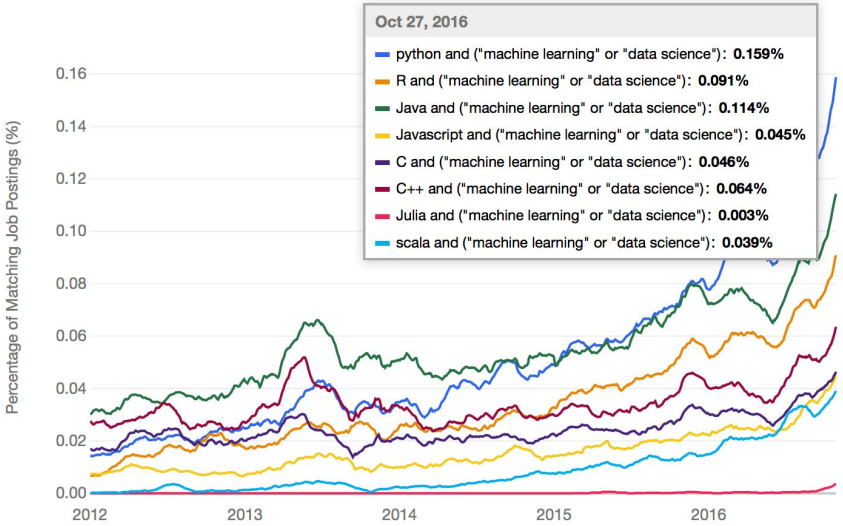
Generate by example: GANs

Useful when:

- Automation of generation of some output is necessary (speech, haircut design, etc.)
- Measuring the quality of generated material is non - trivial

Next Steps

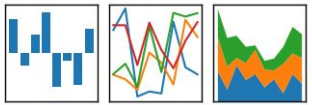
- Learn / refresh basic python skills



- Learn data retrieval and basic processing

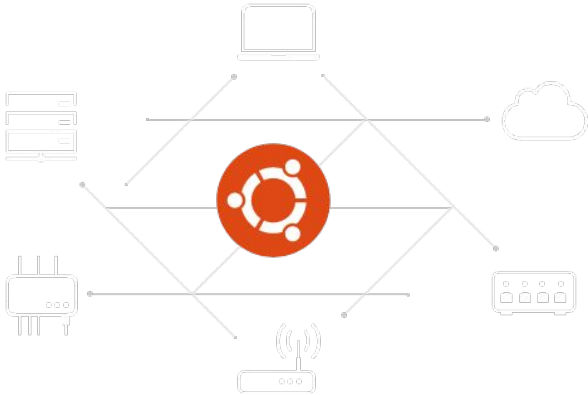
pandas

$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$



Setup

- Ubuntu in virtual machine
  - Platform independent environment
  - Proven to work with all the software we will talk
  - Easy to deploy your setup later on cluster or at scale



- PyCharm IDE
  - Easy to use for projects beyond Data Science