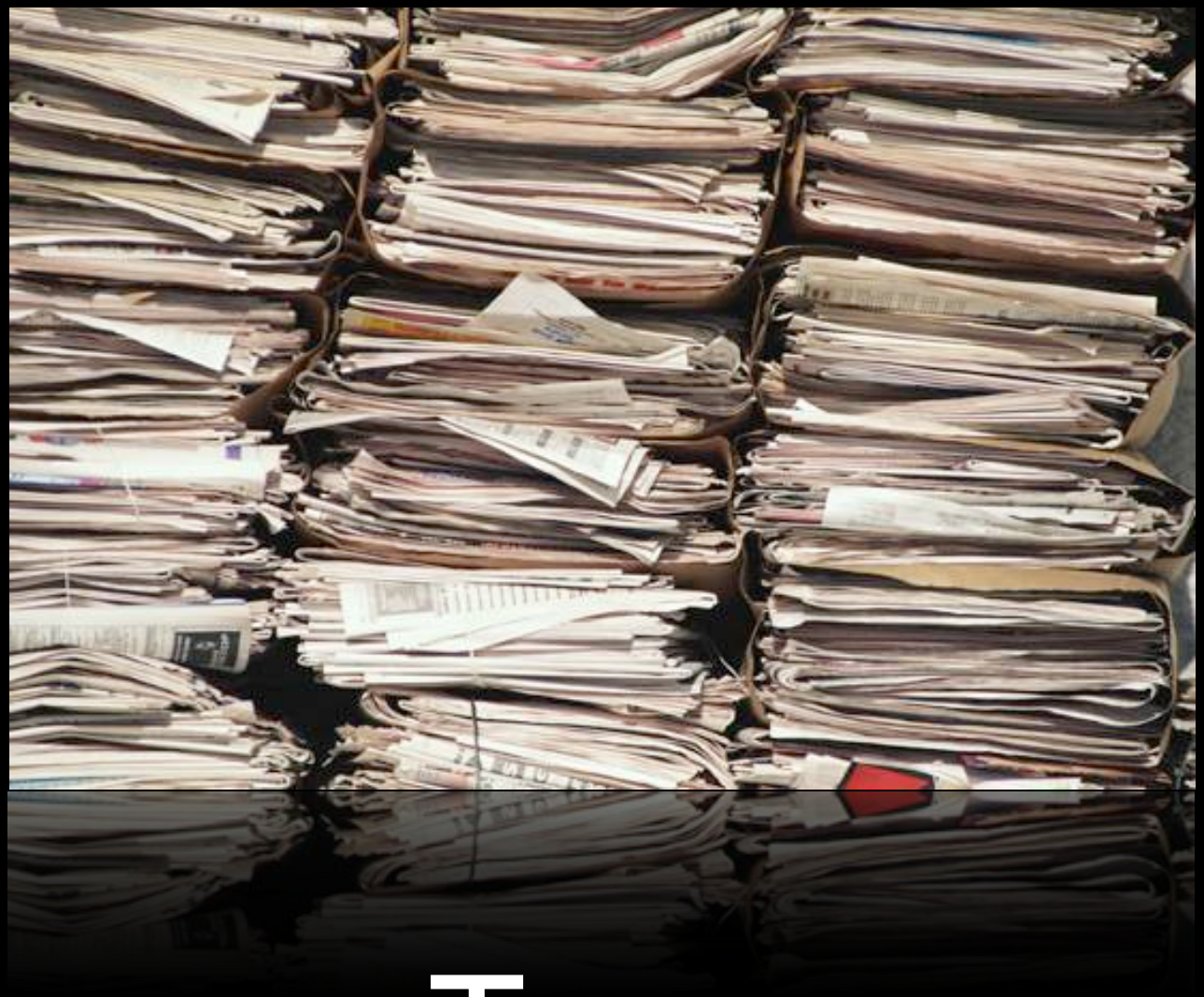
What is IT & Cognition?

What is Scientific Programming?

Perspective #1

Perspective #2

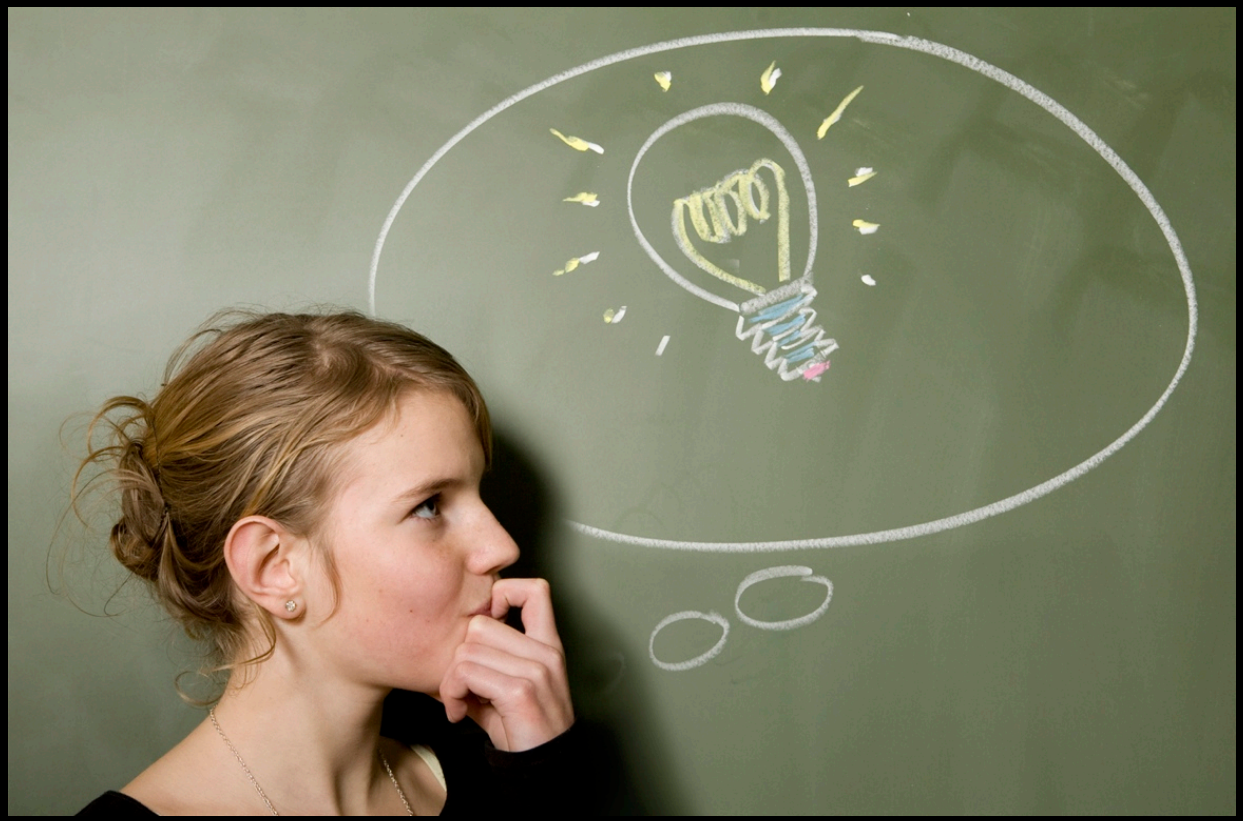


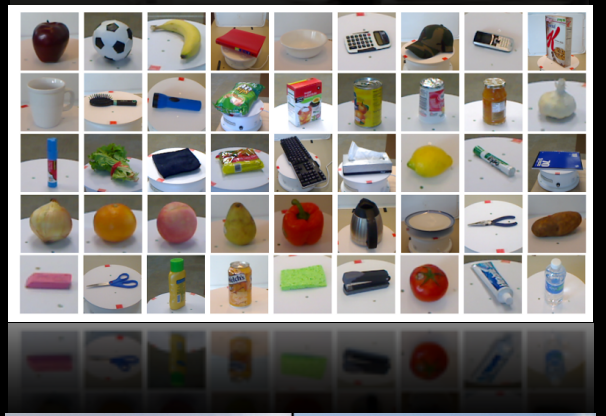
Texts

Images

Both

In two years you will be an expert
in automatic extraction of
information from texts and images...






Perspective #3

Companies (ACL'13)

meltwater
group

POLFOTO

_textkernel

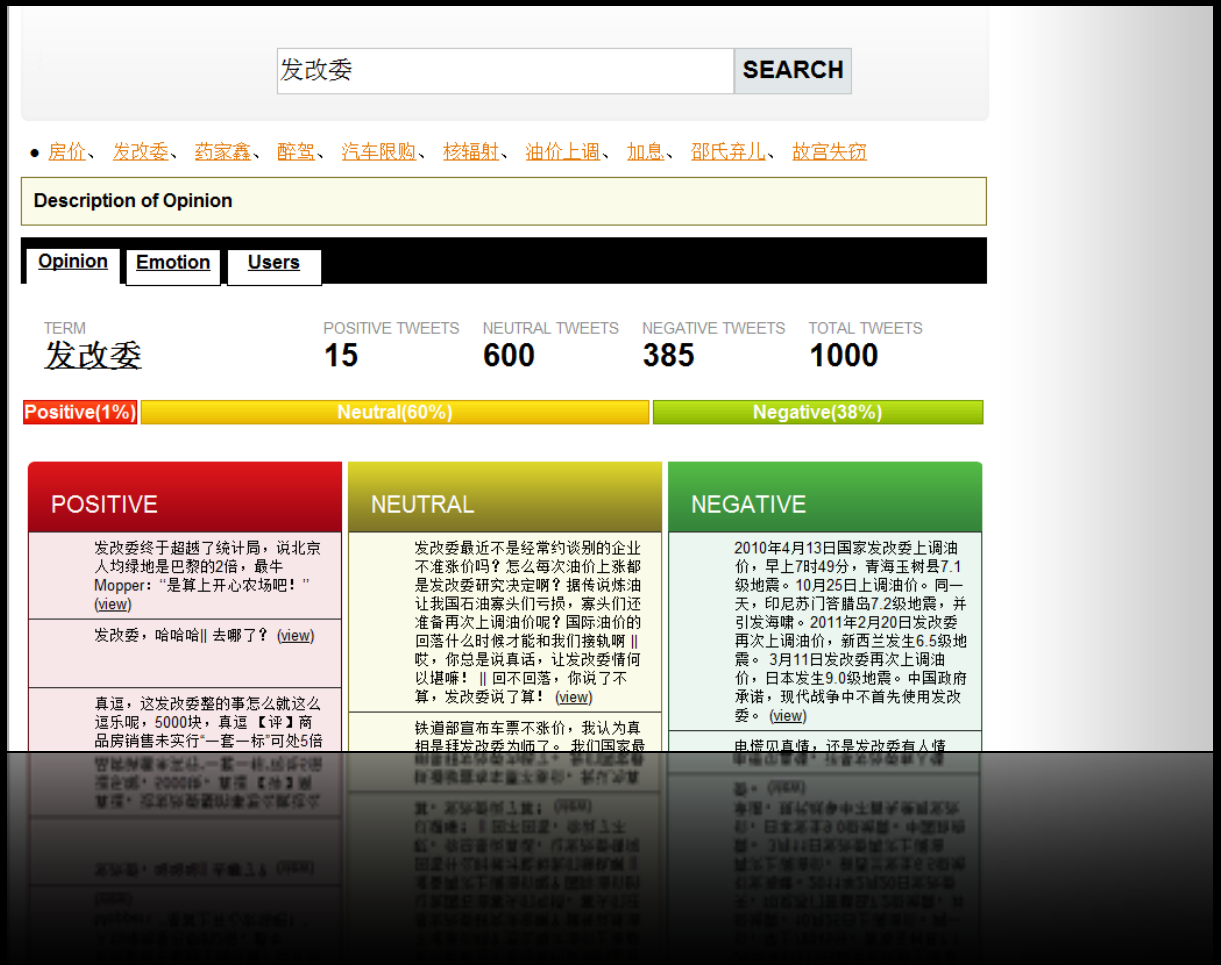
INFOMEDIA

IT & Cognition Advisory Board

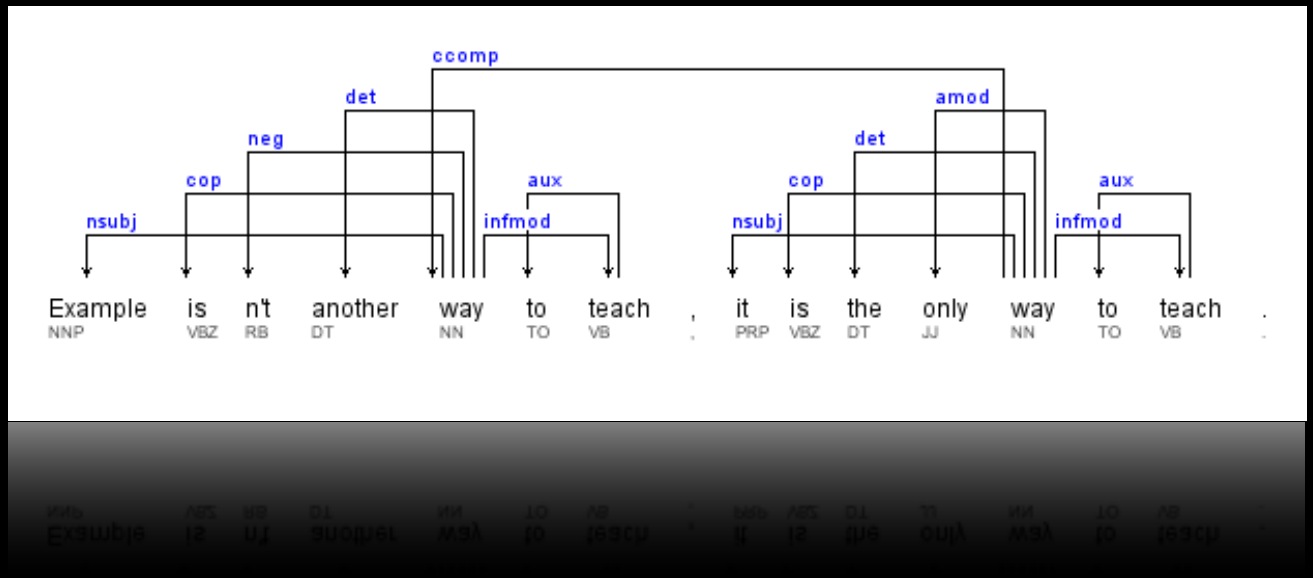
Learning goals

- Manage large collections of texts and images
- Feature extraction
- Data analysis and visualization
- Model induction from data (machine learning)
- Scientific evaluation and statistical analysis
- Scalability
- Web crawling and data collection from Twitter, Facebook, etc.
- **Creative cognitive technologies**

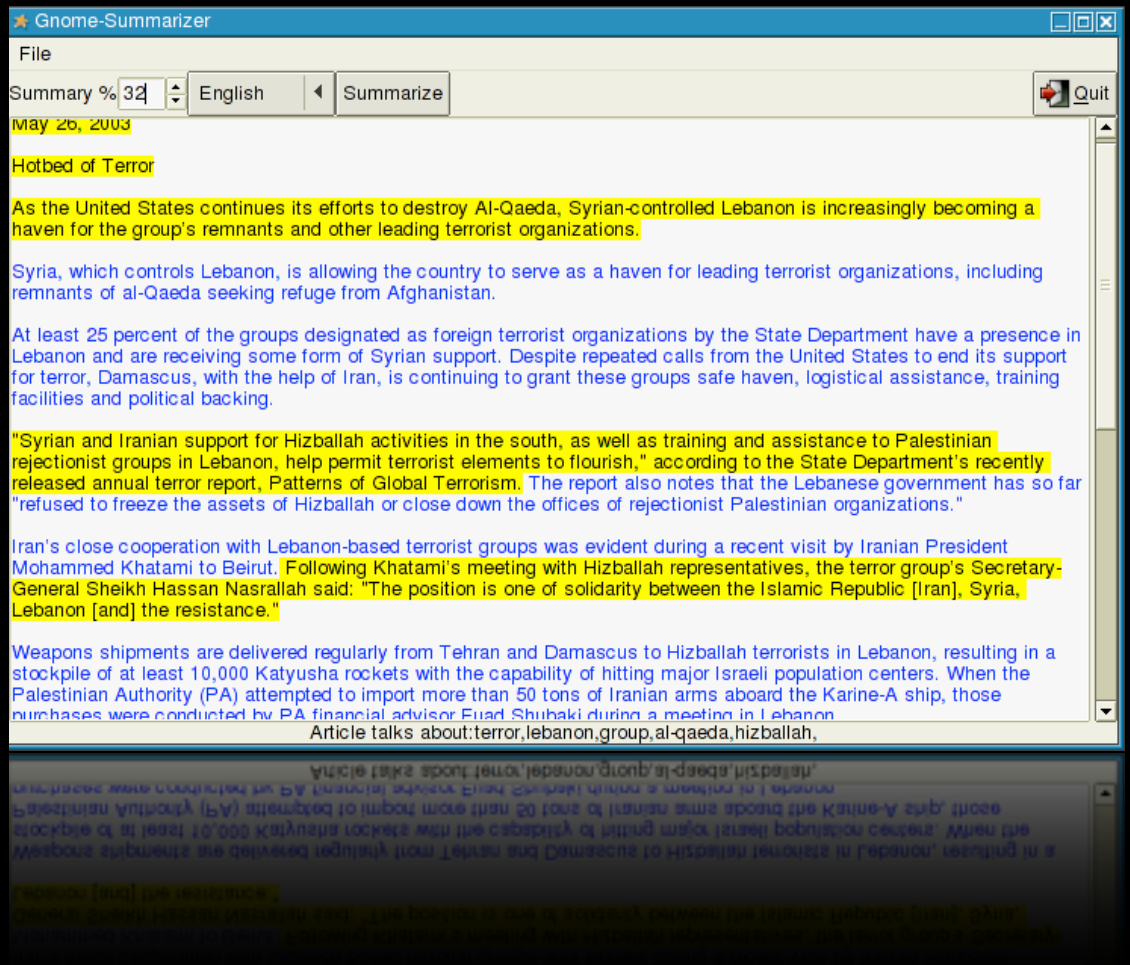
Text processing - Preview



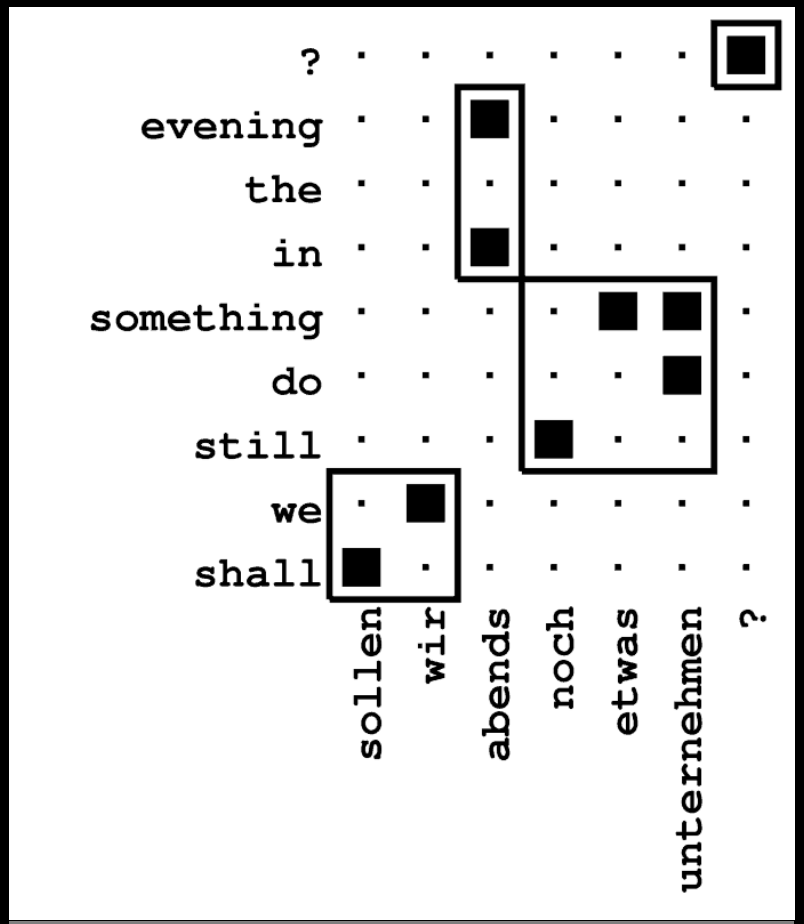
Sentiment analysis



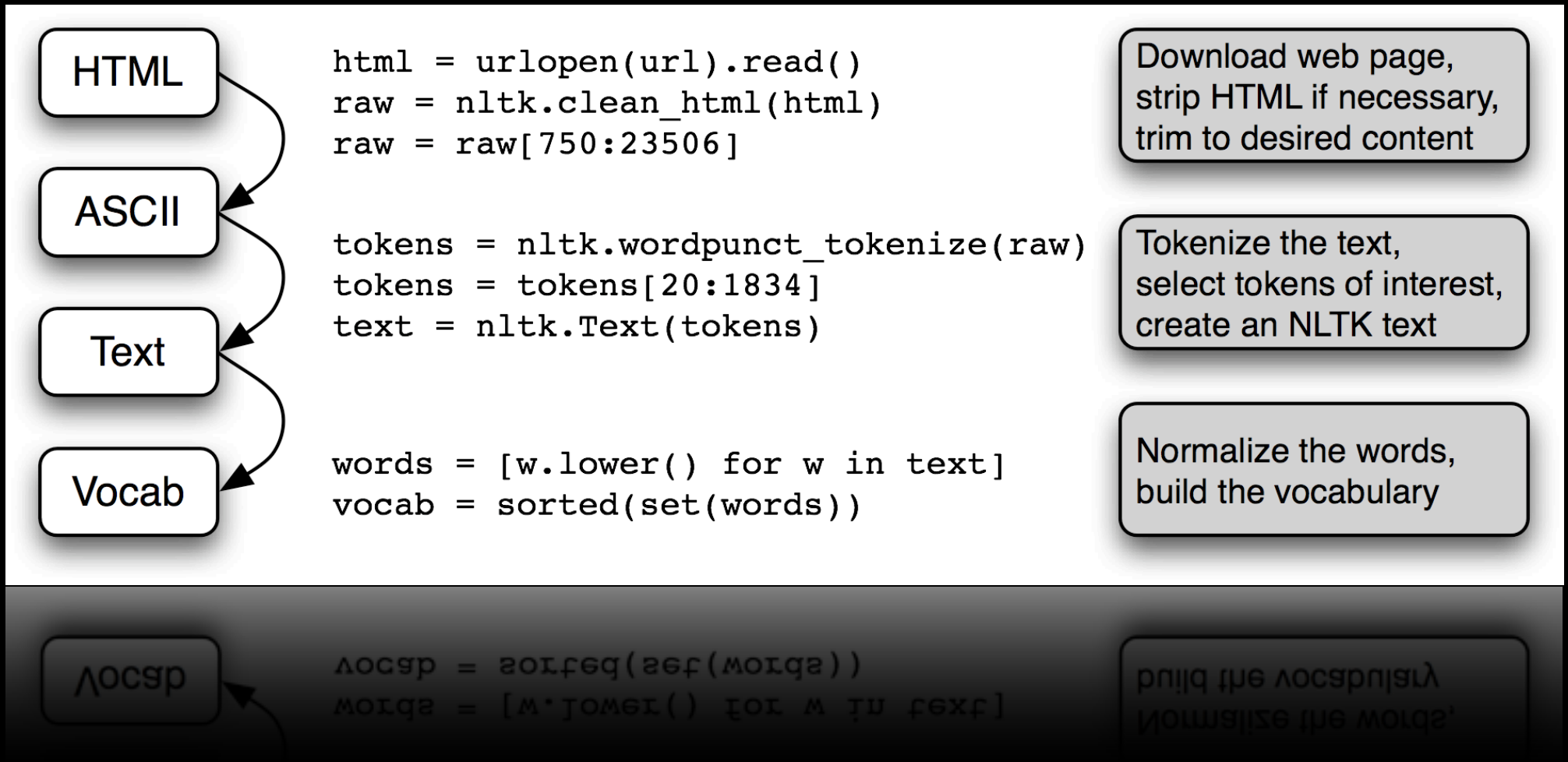
Syntactic parsing



Summarization



Translation



NLTK - website wordlist

Image processing - Preview

Writing an array to a file:

```
from scipy import misc
l = misc.lena()
misc.imsave('lena.png', l) # uses the Image module (PIL)

import matplotlib.pyplot as plt
plt.imshow(l)
plt.show()
```

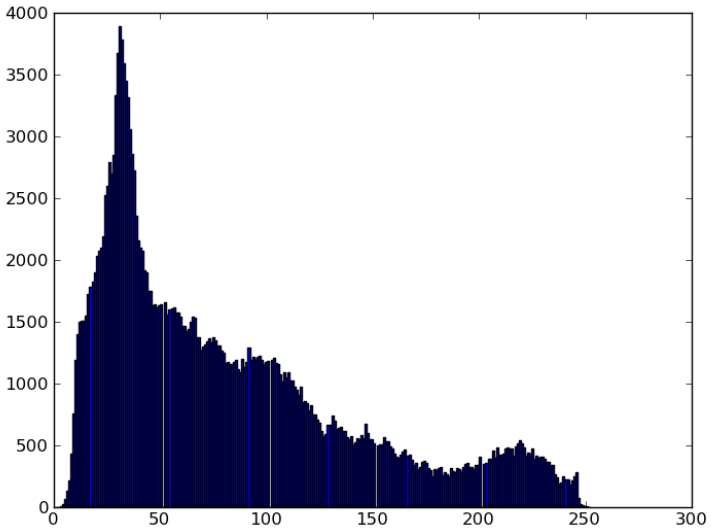
imread, imshow

Simple image processing

Add noise to images

Blur images

Simple image processing



Merge images

Extract image statistics

Thresholding

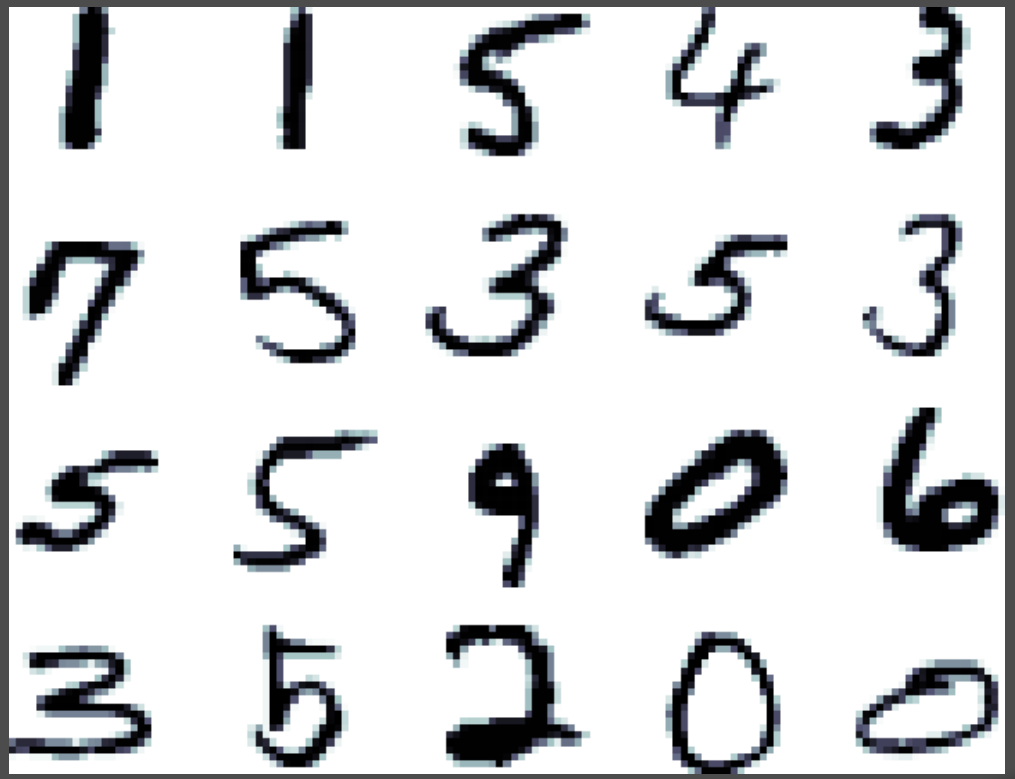
Otsu's Method

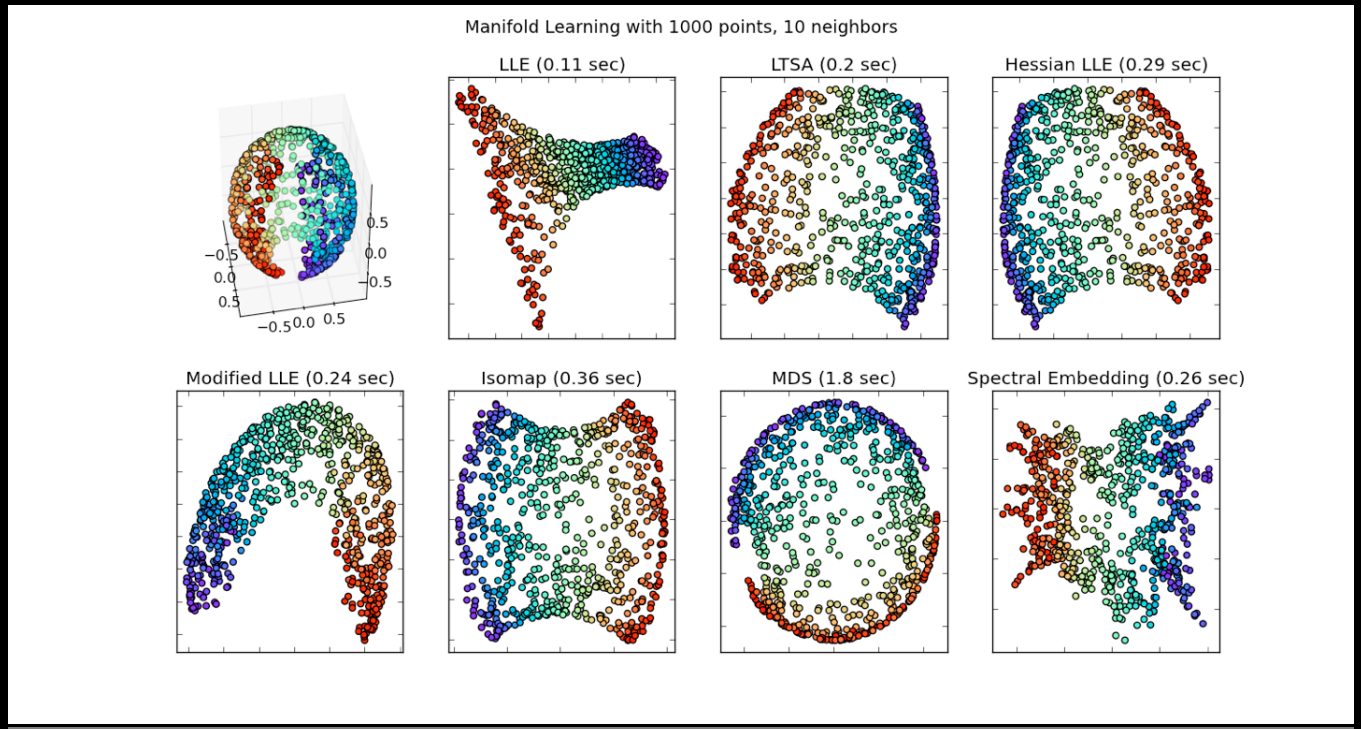
Hm…

Swirling

More seriously

Digit recognition





Visualization

Crash courses

Today and tomorrow
Python Programming
Thursday
Basic calculus: Vectors, matrices, optimization

Today and tomorrow

- Running a Python script
- Loading and printing a text
- Loading and printing an image
- Your first meaningful program
- Data types
- The building blocks of simple Python programs
- Modules

Literature

- Reading material
  - http://upload.wikimedia.org/wikipedia/commons/9/91/Python_Programming.pdf
  - http://programmingcomputervision.com/downloads/ProgrammingComputerVision_CCdraft.pdf
- References: http://docs.python.org/2/tutorial/ and http://scikit-learn.org/stable/
- Video tutorials
  - https://developers.google.com/edu/python/
  - http://marakana.com/s/post/1090/2012_pydata_workshop

Why Python?

- Python is an open-source object-oriented programming language with a supportive community.
- Its main advantage is that it is easy to learn and read; i.e., it reads much like pseudo-code.
- It is very suitable as a first programming language,
- but it is also suitable as your last programming language.
- It is extremely portable and works on Mac, Windows, Unix, Linux, PalmOS, PlayStation, etc.
- Compilation is implicit.
- Memory management is automatic.

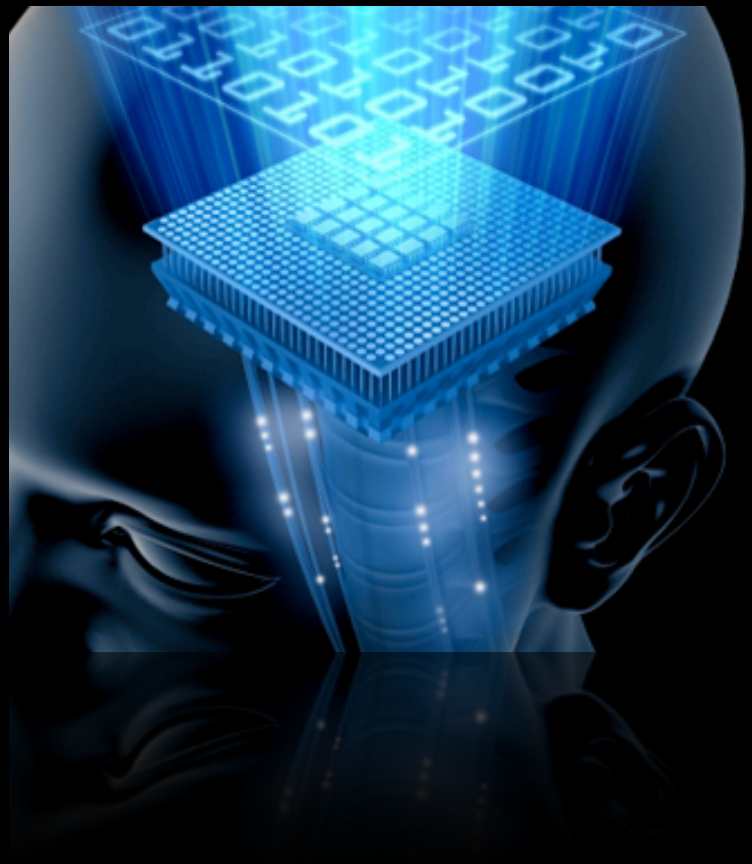
Note: Compared to Java code is up to five times shorter. There is dynamic typing, which means quicker development, and Python uses less memory (a major issue on laptops).

Coding philosophy

Documentation is at your own responsibility.
Speed is nice, but secondary.

Show cases

http://www.youtube.com/watch?v=bh9_uOdz-bU
http://www.youtube.com/watch?v=b58RpVvsfpM
http://www.sentiment140.com/search?query=snowden&hl=en



Today and tomorrow

- Running a Python script
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- Data types
- The building blocks of simple Python programs
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Interactive mode, executables, and libraries

- For interactive mode, type **python**
- To run a script, type **python script.py [args]**
- Or make it *executable*:
  - **chmod +x script.py**
  - **#! /usr/bin/python**
  - **/script.py**
- Scripts/modules:
  - **if __name__ == '__main__':**
  - **main()**

Check list for Day 1

- open, readlines, strip, sys.argv (module: sys)
- str, int, float, list, dict (Try to use '+' and 'len' with different types)
- slices, .append(x), .insert(i,x), .count(x), .reverse(), max(), sum(),
- for, in, range, if, ==, else, Booleans (not, or, and),
- dictionaries (.iterkeys(),.itervalues(),.iteritems())
- <, >, +, -, *, /, **, math.log, math.sqrt (module: math)
- def, return