Week 10: Scientific Programming with SciPy

1. **Organisational**
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Organisational

Application Lecture Topics

- Experiment Design
- Natural Language Processing
- Webscraping

Final Project Scope:

- GitHub Repo with Python scripts
- Effort of ~1 homework per person
- Uses at least one library from the course

Final Project Deadlines:

- Topic Registration: 15.07.2021
- Hand-In: 15.08.2021
- Grading: 31.08.2021

Final Project Grading Criteria:

- Design: Is it sensibly structured?
- Implementation: Does it work?
- Documentation: Is it understandable?

Resources

- API Documentation: https://docs.scipy.org/doc/scipy/reference/api.html
- Submodule Tutorials: https://docs.scipy.org/doc/scipy/reference/tutorial/index.html
- Previous Lectures: https://github.com/scientificprogrammingUOS/lectures
- Detailed Video Tutorial on SciPy: https://www.youtube.com/watch?v=jmX4FOUEfgU

SciPy Stack

SciPy (pronounced "Sigh Pie") is a Python-based ecosystem of open-source software for mathematics, science, and engineering. In particular, these are some of the core packages:

NumPy
Base N-dimensional array package

SciPy library
Fundamental library for scientific computing

Matplotlib
Comprehensive 2-D plotting

IPython
Enhanced interactive console

SymPy
Symbolic mathematics

pandas
Data structures & analysis

Large parts of the SciPy ecosystem (including all six projects above) are fiscally sponsored by NumFOCUS.

SciPy Submodules

Core SciPy Submodules:

- scipy.linalg: Linear Algebra
- scipy.interpolate: Interpolation
- scipy.integrate: Integration and ODEs
- scipy.optimize: (Non-Linear) Optimization
- scipy.spatial: Spatial Algorithms
- scipy.stats: Statistics and Distributions
- scipy.special: Special Functions
- scipy.fft: Fast Fourier Transform
- scipy.io: Utilities for File Handling
- scipy.cluster: Clustering Algorithms

Outlook

Application Lectures:

- Week 11: Natural Language Processing
- Week 12: Experiment Design
- Week 13: Webscraping

n = 13
→ 11 assignments have to be passed in order to pass the course

Regular assignment: 2021-homework10 (link now in StudIP announcement)

Bonus assignment: 2021-homework10-bonus (link published on Wednesday)

Final Project Registration Deadline: 15.07.2021 (mail to all of us)