Python in 10 minutes

Part 10

Dr. Mark Williamson, PhD
Biostatistics, Epidemiology, and Research Design Core (BERDC)
Dakota Cancer Collaborative on Translational Activity (DaCCoTA)
University of North Dakota (UND)
Purpose:

• Quick, bite-size guides to basic usage and tasks in Python
• I’m no expert, I’ve just used it for various tasks, and it has made my life easier and allowed me to do things I couldn’t manually
• I’d like to share that working knowledge with you
Lesson 10: Stepping Out Beyond Hello World

Last time, we worked with Python add-ons and in doing so, cracked open a door to the wide world of possibilities that Python holds. Today, we’ll finish this series by opening that door even wider through showcasing advanced topics Python can tackle. Topics include:

1) Web Scraping (Scrapy, BeautifulSoup)
2) Web Frameworks (Django, Flask)
3) Game Development (PyGame)
4) Machine learning (TensorFlow, Keras)
5) Bioinformatics (BioPython)
Lesson 10: Web Scraping

**Definition:** the collection of data from websites typically achieved through an automatic process such as a web crawler

**Scrapy**
- Widely used for web scraping and other tasks, including automated testing, data mining, and web crawling
- Fast and high-level method for creating spiders to crawl a website and extract data

**BeautifulSoup**
- Used for web scraping, especially quick-turnaround screen scraping projects
- Features simple methods, automatic Unicode conversion, and use of popular parsers
Lesson 10: Web Frameworks

**Definition:** software designed to support the development of web applications like webpages, services, resources, and APIs

**Django**
- High-level web framework that can generate a variety of websites quickly
- Fast, secure, and scalable with unambiguous documentation
- Includes many features for common web development tasks

**Flask**
- Micro framework aimed at keeping core code simple but extendible
- Doesn’t make decisions for you or include functions that other libraries already do
- Great for getting started, hard to create a big website
Lesson 10: Game Development

Pygame
- Set of modules for creating video games, especially 2D games
- Simple and easy to use with multi-core CPU functionality, high portability, no strict GUI requirements, modularity, and more
- Supports a wide range of platforms/operating systems
- Many current projects available
Lesson 10: Machine Learning

**Definition:** using computer algorithms that improve automatically by experience, typically with the use of training data

**Tensor Flow**
- Computational library for developing and training machine learning models
- Optimized for speed with features such as a responsive construct, flexibility, and easy trainability
- Easy model building and walkthroughs for common problems

**Keras**
- Machine learning library for expressing neural networks
- Uses TensorFlow or Theano (another machine learning library) internally
- Slower but very powerful, well supported, and deployable
Lesson 10: Bioinformatics

**Definition:** use of computational methods to understand complex biological data, especially genomic information

**Biopython**

- Set of tools for computational molecular biology
- Includes parsers for common bioinformatics file formats like BLAST, Clustalw, FASTA, and Genbank
- Access to online services like NCBI’s Blast, Entrez, and PubMed and ability to interface with other bioinformatics software
- Common tasks involve sequence manipulation, annotation, input/output, alignment, and BLASTing
Lesson 10: Summary

• Python is a great tool to have at your disposal, whether you are a researcher, web developer, coding enthusiast, or anything else

• Through this series we’ve gone from opening Python for the first time to exploring advanced topics such as bioinformatics or web design

• I hope these quick guides helped you start your Python journey and pointed the way to wider Pythonic horizons

• Please complete a brief, 5-question assessment:
  • [https://und.qualtrics.com/jfe/form/SV_e3T702olifBx1tk](https://und.qualtrics.com/jfe/form/SV_e3T702olifBx1tk)
Lesson 10: Resources

Lists for Top Libraries:
• https://hackr.io/blog/top-python-libraries
• https://tryolabs.com/blog/2020/12/21/top-10-python-libraries-of-2020/
• https://geekflare.com/popular-python-libraries-modules/
• https://www.edureka.co/blog/python-libraries/

Lists for Top Books:
• https://hackr.io/blog/best-python-books-for-beginners-and-advanced-programmers

Websites for Specific Libraries:
• https://scrapy.org/
• https://www.crummy.com/software/BeautifulSoup/
• https://www.djangoproject.com/
• https://flask.palletsprojects.com/en/1.1.x/
• https://www.pygame.org/news
• https://www.tensorflow.org/
• https://keras.io/
• https://biopython.org/