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Learning for Industry 4.0

Introduction to Python Programming

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About the Author

Dr. Pavel Solin is Professor of Applied and Computational Mathematics at the University of Nevada, Reno. He is an expert in scientific computing, leader of open source projects, organizer of international scientific congresses, and the author of several textbooks, research monographs, and many research articles in international journals.

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Our sincere thanks go to many educators and students for providing valuable feedback on this textbook as well as on the self-paced Python I and Python II courses in NCLab.

Preface

Python is a modern high-level dynamic programming language which is widely used in business, science, and engineering applications. According to Github, as of 2018 Python is the second most popular programming language after Javascript. Python's growing popularity has the following reasons:

- It is known as a beginner's language because of its simplicity.
- It helps developers to be more productive from development to deployment and maintenance.

Python's syntax is very simple and high level when compared to Java, C and C++. Therefore, applications can be built with less code. Last, Python has a large collection of powerful libraries.

Python libraries

Thanks to its free libraries, Python is replacing traditional software products in many areas. In data analysis and statistics, Python has become more popular than SAS and even than R. In scientific computing and visualization, the collection of the libraries Scipy, Numpy, Sympy, Matplotlib and Mayavi has become more popular than MATLAB. Python also has powerful libraries for machine learning (Tensorflow, Keras), for graph theory (NetworkX), and many others.

How to read this textbook

In contrast to other languages, Python can be used by non-programmers. Therefore, as the first thing we will show you how to use Python as a powerful command-line scientific calculator and data visualization tool.

Starting with Section 4 we will explore Python as a programming language. We will show you how to work with text strings, variables, tuples, lists, dictionaries, functions, loops, conditions, files, exceptions, recursion, object-oriented programming, recursion, decorators, and more.

In every section, we will begin with simple examples and gradually progress to advanced applications. Therefore, you don't need to read every section until the end. It's perfectly fine to read the first part of a section, move on, and return to the advanced topics later.

Enjoy the textbook, and contact me at `pavel@nclab.com` if you have any questions, find typos, or have suggestions for other topics you would like to see here. Many thanks! – Pavel

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Full text is available upon enrollment.