Python for Finance 101

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What?

- "Python is powerful... and fast; plays well with others; runs everywhere; is friendly & easy to learn; is Open" ▸ Python Documentation
- Its popularity has grown in recent years among people of all ages and industries.
- Since it's relatively easy to learn, Python has been adopted by many non-programmers such as accountants and scientists
- Today it's a programming language used by top-tech companies due to its simplicity and efficiency in specified use cases. Even YouTube is powered by Python programming.

▸ A Brief History of Python

How?

There are many data science tools that make the process of learning how to code in a new programming language significantly easier:

- Anaconda is a nice package containing a lot of Python packages already and allows for an easy start into the world of Python ▸ How to install Anaconda?
- Introducing Kaggle Scripts
- Google Colab lets you write, run and share Python code directly in your web browser using Colab Notebooks ▸ Get started with Google Colaboratory

Further Reading: ▸ Why You Should be Using Jupyter Notebooks?

Motivation

- The most popular language right now was born as a hobby in December 1989. Guido Van Rossum (his creator) was looking for a project to keep him occupied during his free time on Christmas.
- From the outset, van Rossum prioritized several key design principles and goals for Python:
  - Readability.
  - Simplicity. ▸ Java VS Python
  - Flexibility.
  - Extensibility.
  - Cross-platform compatibility.

▸ The Personal Story Behind the Creation of Python

Why?

- Python is ranked No. 1 on the PYPL (PopularitY of Programming Language) index. Also, Python has been the TIOBE index annual award winner for 3 times in the last 5 years. It has grown in popularity, due to boosts in the fields of data sciences and artificial intelligence.
- Netflix, IBM, NASA, Pixar, Facebook, and Spotify use Python in their operations. Python is also used in Pinterest and Instagram.
- Interesting Article. ▸ Coding in the classroom

Why?

The Zen of Python

Python is pure poetry.

A man named Tim Peters composed a poem called 'The Zen of Python'.

▸ 'The Zen of Python'

Simple is better than complex.
Complex is better than complicated.
If the implementation is hard to explain, it's a bad idea.
If the implementation is easy to explain, it may be a good idea.

But, remember, Python is still just **A TOOL**!

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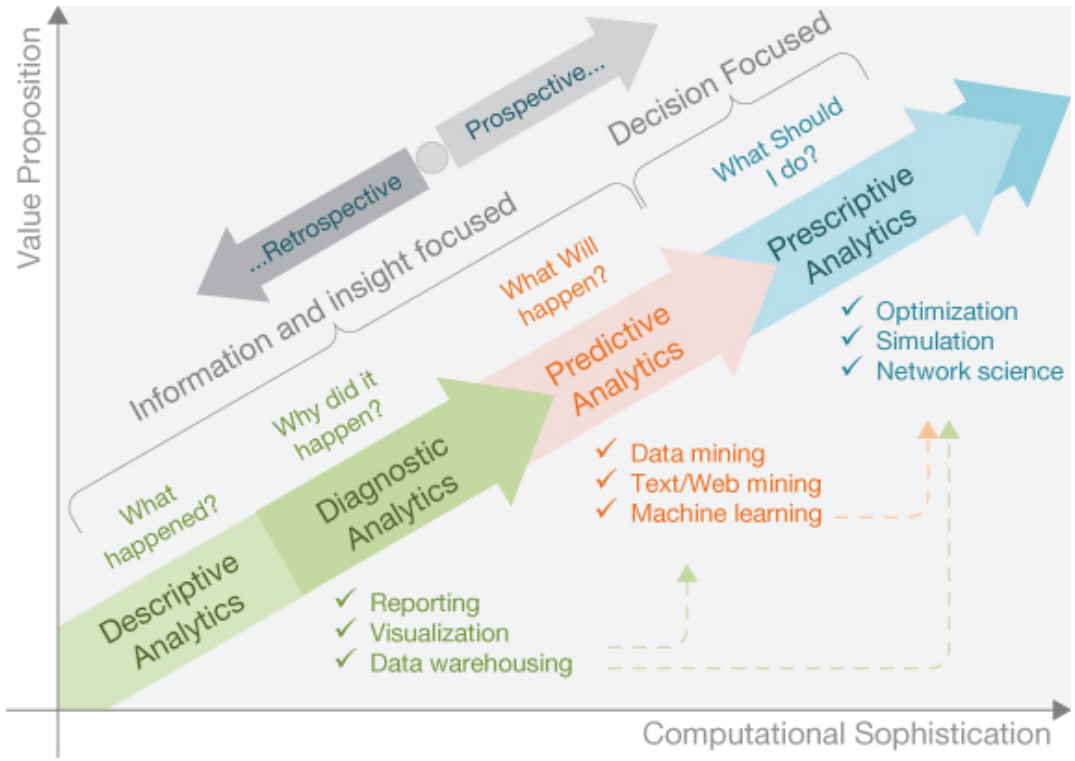
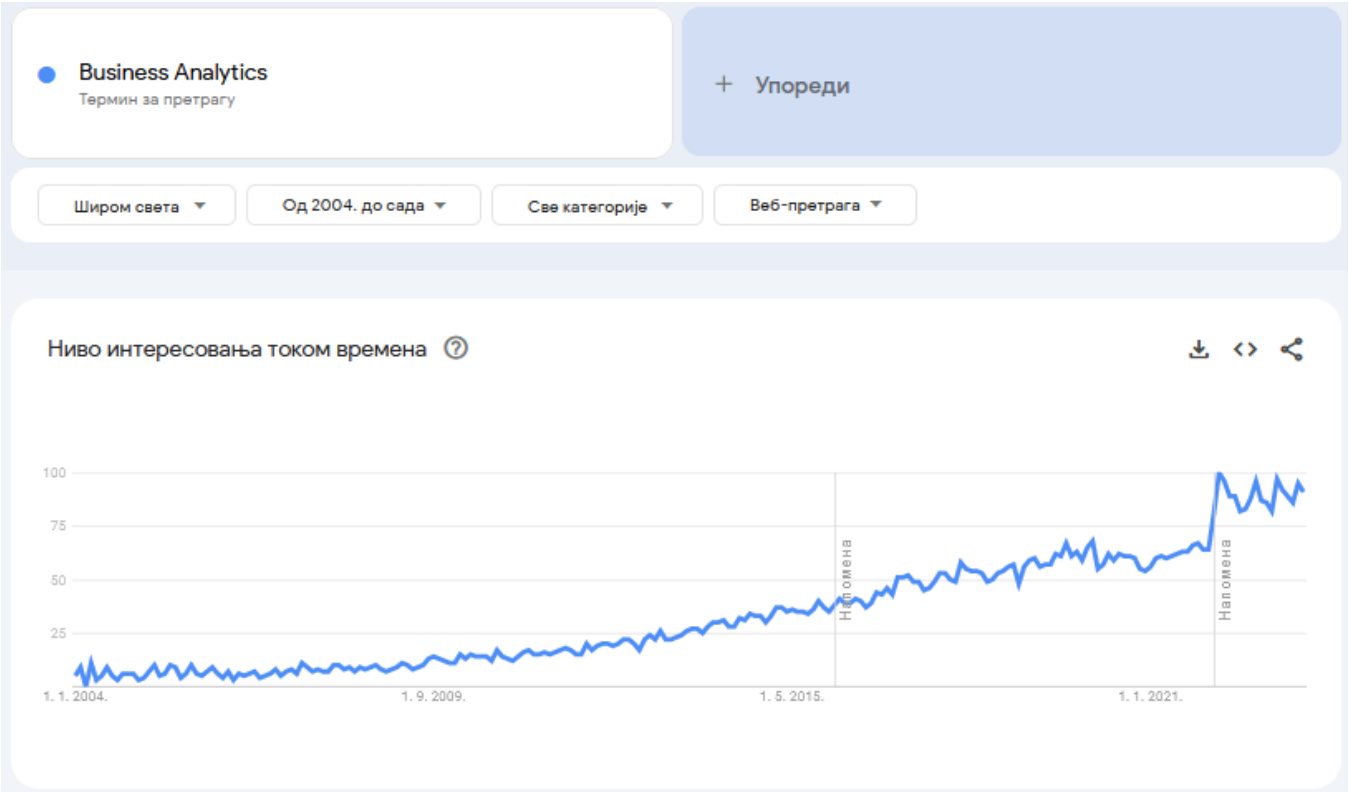
Business Analytics: data-driven decision making and the use of analytical approaches in the decision-making process



Source: Introduction to Business Analytics and Decision-Making

Recommendation: "Enterprise Analytics: Optimize Performance, Process, and Decisions Through Big Data" (Kim and Lev 2013)

Business Analytics



Source: Google Trends

Further Reading: ▸ The importance of continued business analytics education

Data Mining In...

- Insurance
  - Forecast claim costs for better business planning
  - Determine optimal rate plans
  - Optimize marketing to specific customers
  - Identify and prevent fraudulent claim activities
- Brokerage and Securities Trading
  - Identify and prevent fraudulent activities in trading
    ▸ Can Benford's Law Detect Tax Fraud?
  - Assess the effect of events on market movements
  - Forecast the direction of stock fluctuations
  - Predict changes on certain bond pricess

Recommendation: "Fraud analytics using descriptive, predictive, and social network techniques: a guide to data science for fraud detection" (Baesens, Van Vlasselaer, and Verbeke 2015)

Data Mining In...

- Customer Relationship Management
  - Identify and treat most valued customers
  - Maximize customer value (cross-, up-selling)
  - Improve customer retention (churn analysis)
  - Maximize return on marketing campaigns
- Retailing and Logistics
  - Minimize losses due to limited shelf life
  - Optimize logistics by predicting seasonal effects
  - Improve the store layout and sales promotions
  - Optimize inventory levels at different locations

Further Reading. ▸ Data Mining Goes to Hollywood: Predicting Financial Success of Movies

▸ Transitioning from Excel to Python

Let's Start Coding

Data Structures

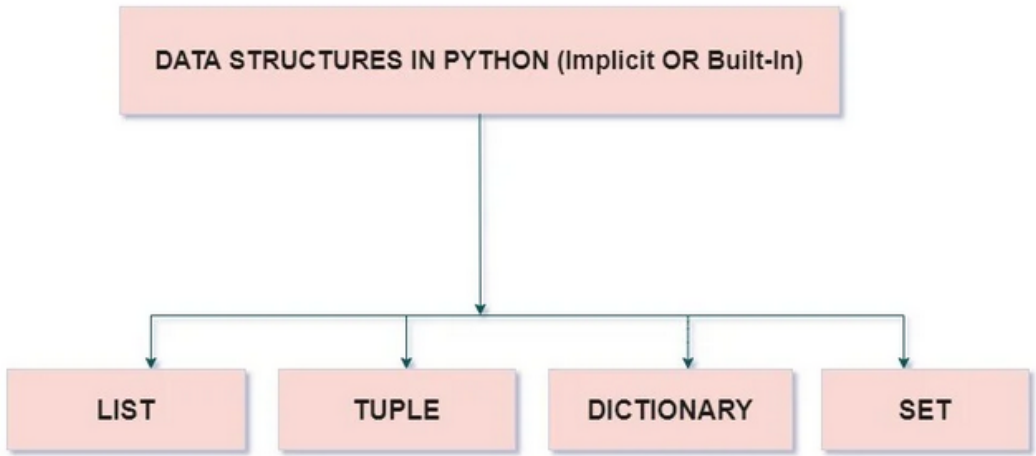


Figure 1: Implicit Data Structures Python

In Python, we use this syntax to create a variable and assign a value to this variable: $< \text{var\_name} >=< \text{value} >$

Data Operators

Relational and arithmetic operators can be applied to numeric variables

- Arithmetic operation
  - For addition: +
  - For subtraction: -
  - For multiplication: *
  - For division: /
  - For powers: **
- Relational Operators
  - For test of equality: ==
  - For test of inequality: !=
  - $<$ for smaller than and $\leq$ for smaller of equal than
  - $>$ for greater than and $\geq$ for greater or equal than

Modules, Packages and Libraries

- Method: a function doing a certain task
- Module: a file with methods, that can be used over and over again
- Package: a collection of modules
- Library: a collection of modules and/or packages that can be installed to your environment

The standard python installation comes with a set of preinstalled libraries

There are many (over 100,000) libraries written by others that can be additionally installed

You can install libraries with !pip install [name of module] and load them with import [name of module]

Modules, Packages and Libraries

Most Popular Python Libraries:

- Pandas: documentation
  - ▸ How to Import Excel and CSV files into Python using Jupyter Notebooks
  - ▸ How To Combine Data in Python
- Scikit-learn: documentation
- Matplotlib: documentation
- NumPy: documentation
- Random
- ...

▸ Turtle Module: Draw Heart Using Turtle Graphics in Python

▸ Five Interesting Modules you Should Know

Python Best Practices, Tips, And Tricks

- 5 Python Best Practices That Every Programmer Should Follow
- 30 Python Best Practices, Tips, And Tricks
- Common Errors in Python and How to Fix Them
- 5 Python Best Practices That Every Programmer Should Follow

Learning Resources

Practice Python

Books.

- "Learning Scientific Programming with Python", (Hill 2020)
- "Python for Finance: Analyze big financial data", (Hilpisch 2014)
- "Python for Finance Cookbook: Over 50 recipes for applying modern Python libraries to financial data analysis", (Lewinson 2020)

Video Lectures.

- Python for Everybody, University of Michgan
- Introduction to Computer Science and Programming in Python, MIT Open Learning Library

Practice Python

Online Websites.

- Real Python
- w3schools
- Edube Interactive: Online Programming Environment
- Kaggle

Online Community Platforms.

- Stack Overflow
- GitHub

Practice Python

Learning Platforms.

- Udemy, Coursera, StackSkills

IMPORTANT.

▸ How to receive Financial Aid on Coursera to Get Paid Course for Free in 2-Easy Steps?

Your First Task.

▸ 60 Python Projects with Source Code

▸ 180 Data Science and Machine Learning Projects with Python

Thank you for your attention! :)

Additional Materials

Java VS Python.

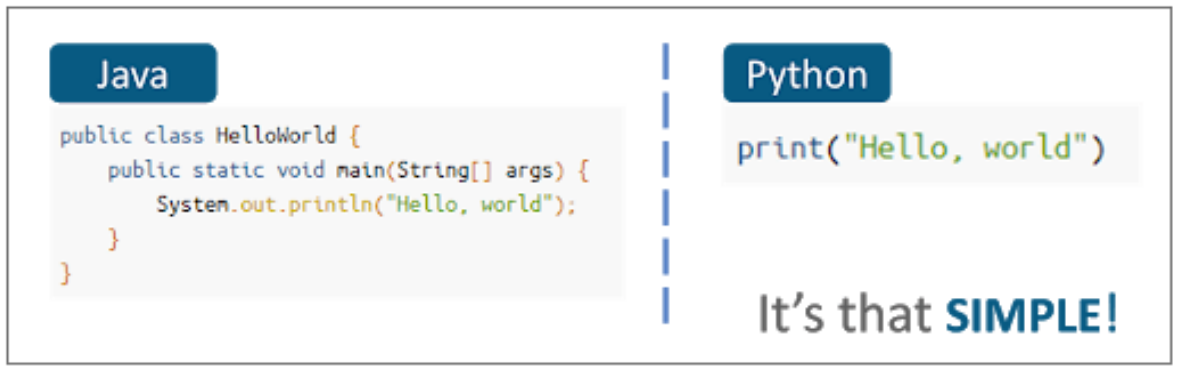


Figure 2: Popularity of the Fiscal Multiplier Topic and its use in research

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