Learning Python with A.I.

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Abstract

In these notes we will see how one can appropriately use Artificial Intelligence (A.I.) to learn Python and to construct code.

Introduction

At the following link you can use the Qwen A.I., https://chat.qwen.ai/

The main idea of these notes is to guide the reader gradually in learning the Python language with the help of the above A.I. or any other A.I. you want.

1 Colab

First, we need to learn the environment in which we can create and run Python code. Ask the A.I. the following question.

Prompt to A.I.

How can I use Colab for Python?

Then follow the instructions. Download this zip file, which contains lessons for learning Python written entirely by A.I. These files are `.ipynb` and must be uploaded to Colab.

2 First Steps in Python

Suppose you want to create a mathematical function in Python that outputs its values and its graph. You can write the following to the A.I.

Prompt to A.I.

I have a mathematical function and I need to compute its values and its graph.

It will give you the method and some examples. You can ask for the function to have two or more variables.

Prompt to A.I.

I have two matrices of numbers and I want to multiply them.

The A.I. will explain how we can multiply matrices or vectors in Python. Ask for examples of matrix input.

Prompt to A.I.

I have a vector and I want to append one more element. The same for a matrix.

Prompt to A.I.

How will I compute the local extrema of a function with Python?

It will provide instructions and examples.

Prompt to A.I.

I have a sequence and I want to compute its limit.

Prompt to A.I.

How will I compute the infinite series of a sequence?

Prompt to A.I.

How will I compute the first derivative (or higher order derivatives) and the integral of a function?

3 Financial Data

Obviously, it is very useful to have financial data in order to perform computations.

Prompt to A.I.

I need financial data from Yahoo Finance, including call and put options.

You can study the Python code available on eClass to see how we download financial data and store them in vectors or matrices.

Prompt to A.I.

I am interested in constructing a portfolio that includes stocks and some call and put options with different strike prices. Can I place an order on the exchange so that either all transactions are executed or none?

It is also obvious that studying only past data is not sufficient for a reasonably good prediction of a stocks price behavior. It must be combined with past events from the same period.

Prompt to A.I.

How can we forecast stock prices with Python? I want to use past numerical data that are correlated with events from the corresponding time period.

Do not expect, of course, to receive a complete program that does exactly this, but you will understand that it is possible and that it (simply) requires careful work as well as access to the relevant data.

4 If–else, for, while

Prompt to A.I.

How does `if ... else` work?

Prompt to A.I.

Explain to me how `for` works.

Prompt to A.I.

How does `while` work?

Use the suggested examples and create your own.

5 Optimization Problems

Suppose you have a linear programming problem that you want to solve, like those in the notes.

Prompt to A.I.

How will I solve a linear programming problem?

Prompt to A.I.

I want to solve a linear programming problem with integer and real solutions.

Prompt to A.I.

How will I solve an optimization problem?

You can provide very complex mathematical problems to be solved, but the difficult part is how you will present them to the A.I.

Prompt to A.I.

If I want to give you a very complex mathematical problem, how can I present it to you?

6 Building Code for a Minimum-Variance Portfolio

In this section we will see how to construct Python code that implements Markowitzs theory. First, it is good to ask the A.I. to explain how to compute the mean return of

a stock and its variance, as well as the covariances of two or more stocks, assuming of course that we have historical numerical data.

Prompt to A.I.

If I have the prices of two stocks, how do I find the mean of the returns, the variance, and the covariance?

It would be good to ask it to provide this text in LaTeX form so that we can generate the PDF. Ask how to compile from LaTeX to PDF.

Observation

A good format for communicating mathematical problems with A.I. is LaTeX. Ask it to teach you the basics so you can write simple documents with complex mathematics, images, graphs, etc. See the file LaTeX for Beginners, which was created entirely by A.I.

The next step is to obtain a method to fetch historical data for a number of stocks.

Prompt to A.I.

I need Python code that downloads data for three stocks and computes the above quantities.

The question, of course, is how much historical data you want to download.

Prompt to A.I.

I want the user to specify the number of months of historical data, including yesterday.

Prompt to A.I.

The selection of the number of months should be done in real time with some widget.

It will provide us with a nice way to select the amount of historical data. This will be useful later to compare results.

Prompt to A.I.

I would now like you to implement Markowitzs theory and compute the proportion (i.e., the weights) of each stock in a portfolio. I am interested in a minimum-variance portfolio and in including Value at Risk. Can you add widgets so the user can set the capital or the confidence level?

You should test what it provides and request corrections and improvements. Any errors you encounter can be copypasted so it can suggest solutions.

References

[1] Nikolaos Halidias. *Financial Mathematics*. Notes, 2025.