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Quant test

Congratulations on making it through to the next step of the interview process!

This step consists of a coding / statistics challenge.

Below you have 3 questions; Use Python to solve/answer each, using any IDE you wish to do so.

In addition to your answers, you will also be evaluated base upon your code, knowledge of python, OOP and readability.

Submitting your answers

We'll need a copy of both your code and question answers.

Please upload these to your GitHub and send us your account username / url once ready.

Please make sure to use different python files for different questions!

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Question 1

Antarctica is currently looking to hire a quant analyst. Ashil believes that the best way to screen candidates is to look at their prior programming experience via GitHub. Create a GUI which allows a user to enter a GitHub username and file location and contains a button. When the button is pressed, have an excel file containing the names of all repositories of that GitHub user saved to the file location on the user's PC. **Do not use the github python package** or any api provided by github in your work.

Question 2

You are provided with returns data for an equity long/short hedge fund and several common factors in the 'returns data' sheet of the excel. Rana is interested in this particular fund and asks you to perform some analysis on its returns.

2.1

Fit a multilinear regression model to the data, calculating the funds alpha and betas. Perform any steps you believe are necessary to produce the best model, detailing them as you go along.

2.2

Evaluate your model.

2.3

Tyler is sceptical about investing in this fund. He thinks it might be more profitable for us to simply invest in the underlying factors and save on any performance and management fees applied by the fund manager. Using your model, determine which would be the most profitable strategy. Calculate the sharpe ratio for each.

2.4

Following on from this, which strategy (investing in the fund vs investing in the factor portfolio) is more risky? Perform any calculations you need to answer this question.

2.5

Are the betas you calculated stationary? Perform any calculation/analysis necessary and comment on what impact this might have from a risk point of view.

Question 3

You are asked to analyse some user data taken from the Antarctica Hub website, provided in the 'website data' sheet of the excel. Here you have the estimated wait time users face before they are able to login to the Hub as well as the number of users/visitors to the Hub website that hour.

For 3.1, 3.2, 3.3 and 3.4 **do not use any empirical/kernel distributions.**

3.1

Find and specify the distributions of the estimated wait time and the number of hourly visitors, giving reasons for each.

3.2

Using your fitted distributions, calculate:

i) The probability that the estimated wait time is greater than 10 minutes.

ii) The probability that the number of visitors is less than 46.

3.3

What is the relationship between these two sets of data? How can we model this (if at all)?

3.4

Rana is not happy with the current website. She has received many complaints of clients taking far too long to login. You wonder whether the system is being overwhelmed by large numbers of visitors. Calculate the probability that when we have 50 or more visitors per hour, they can expect to wait more than 7.5 minutes to log on.

3.5

You are provided with an additional set of returns data, for 10 assets A-J, in the 'tick data' sheet of the excel. Some of these asset returns are genuine, whilst others have been simulated. Determine which assets are real and which are fake/simulated, explaining in detail how you did so.