

COMSM0090 Advanced Financial Technology

Continuous Assessment (CA) 2

Release date: 18th /Feb/2022 (Friday, week 4)

Submission deadline: 1pm, Friday, 25th/ Feb/2022 (UK time). You must submit your report before the deadline, or you will receive late penalties.

Weighting: This assessment is worth 10% of your total unit 20 credits. There is a total of 30 points in this CA and the final mark will be 1/3 of your achieved points.

Submission: Via the ADFT BlackBoard (BB) coursework assessment page, submit 1) one PDF file with named using your UOB username.pdf via Continuous Assessment 2 (Turnitin Submission) in BB; 2) one Jupyter Notebook used to implement codes to answer questions with named using your UOB username.ipynb via Continuous Assessment 2 (Instructions and Code Submission) in BB. Note that your marks will be based on the PDF report file. However, if necessary, we will view your code to validate that what you have written in your report is true. If you do not submit the code, we may have doubts about your work, which may negatively affect your mark.

Note: 1) You are allowed to use codes in our lab sessions. But don't share your code and answer with anybody. You are welcome to discuss questions with other students, but don't share the answers. 2) Two pages maximum or 1000 words maximum; you will lose marks for going over.

Questions:

Download dataset AMZN.csv from Blackboard. This dataset consists of the daily closed stock price of Amazon.Inc.com from 04/Jan/2021 to 30/Dec/2021. Your task is to perform a time series analysis of this dataset based on the following questions:

- 1) (5 points) show a chart to visualize the closed stock price from 04/Jan/2021 to 30/Dec/2021 and write some observations based on this chart.
- 2) (5 points) What are the characteristics of a stationary time series? Is this time series data in AMZN.csv likely to be stationary and why? Check it with the naked eye.
- 3) (5 points) Summarise the process of calculating autocorrelation function and partial autocorrelation function with mathematical formulations.
- 4) (10 points) Plot the predicted and true stock price with the autoregressive (AR) model on a test set and describe your observations from this plot. Requirements:
1) You need to list key steps and their results (e.g., PACF plot) to predict the stock price. You will lose marks if you only show the final plot about prediction; 2) You need to split this dataset into a train (70%) set and a test (30%) set. Use the train set to train an autoregressive (AR) model and make a prediction on the test set; 3) You need to implement the AR model from scratch rather than using the existing Python library.
- 5) (5 points) What are the strengths and weaknesses of the AR model? Are there some ways to overcome such weaknesses?

Marking criteria:

Your marks will be based on the following four aspects:

I: Layout and presentation: 1) include the use of references and citations; 2) quality and clarity of written English.

II: Clear analysis and results produced by codes: 1) Provide clear steps and analysis for questions; 2) Use appropriate methods to work out the questions; 3) Show understanding of the key concepts; 4) Interpret the results correctly; 5) Learn different methods or additional knowledge beyond classroom material

III: Illustration of understanding of questions after self-study: 1) Show appropriate understanding towards the questions; 2) Adequate evidence of independent learning and experimenting

IV: Critical reflection: 1) Clearly communicate their own thoughts, identified issues/challenges faced during the assignment; 2) Understand the limitations of the current work; 3) Ideas/thoughts that are rational and realistic, potentially linking them with related literature, instead of vague and superficial, are valued; 4) Include adequate academic references