COMSM0090 Advanced Financial Technology

Continuous Assessment (CA) 2

Release date: 17th /Feb/2022 (Friday, week 4)

Submission deadline: 1pm, Friday, 24th/ 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 2023) 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. You will not have any marks if you submit your assessment to the wrong submission point. 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.

Format: You are required to use IEEE format (Word or Latex, download link: https://www.ieee.org/conferences/publishing/templates.html) with double columns, and the maximum length of your report should be no more than **two** pages in this IEEE format including everything (e.g., figures, references).

Note: 1) You are allowed to use codes in our lab sessions, but don't share your codes and answers with anybody. You are welcome to discuss questions with other students, but don't share the answers. 2) If you think introducing codes is an excellent way to show your study for this assessment, you can do it because I do not want to limit your ideas by giving you a rigorous format. However, a large

block of codes should not be found in your report since it may show that you do not understand questions properly (e.g., simply copy and paste codes).

Questions:

Download dataset MSFT.csv from Blackboard. This dataset consists of the daily close stock price of Microsoft from 31/Dec/2021 to 30/Dec/2022. 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 close stock price from 31/Dec/2021 to 30/Dec/2022 and write some observations and thinking based on this chart.

2) (5 points) What are the characteristics of a stationary time series? Is this time series data in MSFT.csv likely to be stationary, and why? Check it with the naked eye.

3) (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.

4) (10 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