UNIVERSITY OF WESTMINSTER

WESTMINSTER BUSINESS SCHOOL

ASSESSMENT I

Module Code:
Module Title: **Artificial Intelligence and Machine Learning in Finance Services**
Module Leader: **Dr Yumei Yao**

Submission Deadline: **13:00 Friday 29th March 2024**

Instructions to Candidates:

Please read the instructions below answering the questions

- The assignment needs to be undertaken **individually**.
- Present your coursework in a report format, referencing your literature reviews etc by utilising the Harvard reference system.
- Word target is 2000 with a ±10% tolerance, excluding appendices, tables, codes, and the outputs of codes.
- Submit your work electronically through the approved Blackboard courses link (as advised).
- All work must be submitted in PDF format via the Module Blackboard link. It will be checked via Turnitin for plagiarism.

Coursework requirement (this CW carries 50% of the total module mark)

- You are advised to review all class notes, problems and exercises together with journal articles and books to complete your assessment.
- Any content you use from external source materials will need to be referenced correctly. Whenever you directly quote, paraphrase, or summarise someone else's ideas, you have a responsibility to give due credit to that person for their work. Support can be found at https://www.westminster.ac.uk/current-students/studies/study-skills-and-training/research-skills/referencing-your-work

Requirements:

You should use Python and the libraries taught in the module to solve the questions. Choose your parameter values or keep default parameters in the Python library.

Tasks:

Choose a company in any economic region or country, e.g., your home country or UK/US, etc.

Write a brief introduction of the background of the company.

Obtain historical data on the company's **daily** stock prices from 01/2014 – 12/2023 from Yahoo Finance or other platforms/websites. If the data is not available sometime during the period, use the maximum available length of the period.

Generate some features that measure the characteristics of stock prices such as rolling averages and rolling standard deviations.

Do an EDA analysis of the above features. Present tables/figures and your discussions.

Use two machine learning classification methods (e.g., Logistic Regression and Extra Trees) to predict the price rise.

For each method, run a cross-validation to calculate the mean and standard deviation of the accuracy.

Present an evaluation of these methods based on the outputs.

Use one method (e.g., Extra Trees) to predict the price rise based on your X_test data. Use the test set to obtain a classification report. Draw a plot of the confusion matrix and a ROC plot.

Create the columns of Market Returns and Strategy Returns based on your prediction of price rise.

Create the columns of Cumulative Market Returns and Cumulative Strategy Returns based on your prediction of price rise. Plot the time series of these two returns.

Choose one of the assumptions: Machine learning **can/cannot** predict the rise of the selected stock price data. Provide interpretation and debate based on your results and your selected literature.

Cite references. You can use the references provided by the module or the references found by you, or a mix of both sources of references.

Marking scheme:

See the marking rubric. This is an open-question coursework. There is no 'correct or wrong' answer. You can choose either assumption as long as that you support it with reasonable arguments and evidence. It is fine if the performance of your machine learning (precision, accuracy etc.) and/or trading strategy is not high, which is common in the market as it is difficult to win over the market.

Guidance:

All of the above data operations are shown in the examples of Jupyter Notebooks online for our lessons. You can copy these codes to do your coursework. Be aware of different names of variables/methods/instances/dataframes/parameters etc. when you re-use the codes.

Submission of Coursework

Unless explicitly stated otherwise in writing by the module leader, all coursework on this module is submitted via Blackboard only. It will automatically be scanned through a text matching system (designed to check for possible plagiarism).

To submit your assignment:

- Log on to Blackboard at http://learning.westminster.ac.uk;
- Go to the relevant module Blackboard site;
- Click the 'Assessment and Submission Links' in middle;
- Click on the link for the relevant assignment;
- Follow the instructions.

You will be given details by the module teaching team about how and when you will receive your marks and feedback on your work.

Students will be required to submit the assignment online and are therefore required to familiarise themselves with how to do this **well ahead of the deadline**. Excuses such as 'I did not know how to submit' will not be accepted.

Any submission by email is **not acceptable** and **will not be marked** (please read the document entitled 'Turnitin submission issues' so that you are aware of some of the most common Turnitin issues when submitting your coursework).

At busy times the coursework submission process may run slowly. To ensure that your submission is not recorded as a late submission, avoid submitting very close to the deadline.

Difficulties in submitting assignments on time

If you have difficulties for reasons beyond your control (e.g., serious illness, family problems etc.) that prevent you from submitting the assignment, make sure you apply to the Mitigating Circumstances board with evidence to support your claim as soon as possible. You should contact the |Library and Student Centre| for this or Email: studentcentre@westminster.ac.uk.

REMEMBER:

It is a requirement that you submit your work in this way. All coursework must be submitted by 1300 hours on the due date.

If you submit your coursework late but within 24 hours or one working day of the specified deadline, 10% of the overall marks available for that element of assessment will be deducted, as a penalty for late submission, except for work which is marked in the range 50 – 59%, in which case the mark will be capped at the pass mark (50%).

If you submit your coursework more than 24 hours or more than one working day after the specified deadline you will be given a mark of zero for the work in question.

The University's mitigating circumstances procedures relating to the non-submission or late submission of coursework apply to all coursework.

Academic integrity

What you submit for assessment must be your own current work. It will automatically be scanned through a text matching system to check for possible plagiarism. Do not reuse material from other assessments that you may have completed on other modules. Collusion with other students (except when working in groups), recycling previous assignments (unless this is explicitly allowed by the module leader) and/or plagiarism (copying) of other sources all are offences and are dealt with accordingly. If you are not sure about this, then speak to your module leader.

University of Westminster Quality & Standards statement:

Plagiarism is a particular form of cheating. Plagiarism must be avoided at all costs and students who break the rules, however innocently, will be penalised. It is your responsibility to ensure that you understand correct referencing practices. As a University level student, you are expected to use appropriate references and keep carefully detailed notes of all your sources of material, including any material downloaded from the web.

Plagiarism is defined as submission for assessment of material (written, visual or oral) originally produced by another person or persons, without acknowledgement, in such a way that the work could be assumed to be your own. Plagiarism may involve the unattributed use of another person's work, ideas, opinions, theory, facts, statistics, graphs, models, paintings, performance, computer code, drawings, quotations of another person's actual spoken or written words, or paraphrases of another person's spoken or written words. Plagiarism covers both direct copying and copying or paraphrasing with only minor adjustments:

- A direct quotation from a text must be indicated by the use of quotation marks (or an indented paragraph in italics for a substantive section) and the source of the quote (title, author, page number and date of publication) provided;
- A paraphrased summary must be indicated by attribution of the author, date and source of the material including page numbers for the section(s) which have been summarised.