

CSM6120 Fundamentals of Intelligent Systems

Assignment 2: Essay on application of machine learning and data science techniques to a real-world problem

Academic Year 2023–2024

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1 Introduction

This is the second assignment for CSM6120 ‘Fundamentals of Intelligent Systems’ and comprises 60% of the total marks for the module. It gives information about the different sections, how and when to hand in, specifies the tasks you have to perform, and highlights the criteria from which the assignment will be marked. Please follow these instructions carefully. If anything is unclear or you have any questions, please, send an email to tob45@aber.ac.uk!

This assignment asks you to research how different machine learning and data science techniques have been applied to **a real-world problem**. Ideally, the problem that you select should be within the area of your interest, issues that you prefer to know more about, or perhaps related to your degree project (as a background, at least). For example, a prediction of stock price, a detection of network attacks, and a classification of emotion from facial expression. In addition, it may be an improvement of one particular machine learning or data science technique based on heuristics or intelligent approaches.

Using what you have learned in the module as a starting point, you are asked to perform a literature review/discuss past attempts of solving your choice of problem using machine learning and data science methods, as well as highlight your viewpoint regarding direction(s) of future research.

2 Hand-In

You have to write an essay that introduces the problem, details the result of a literature review, discusses how the problem can be solved using machine learning and data science techniques, and also describes your conclusion and what you would suggest if you had to solve the problem yourself. The length of your essay must be **at least 3,000 words** (*but not more than 3,200*), excluding references. There is no page limit, but please use the font size 11. A good essay explains its topic in sufficient detail without being unnecessarily wordy. Make sure that you include approaches that are particularly significant as well as recent approaches.

You are asked to submit via Blackboard. The deadline for submission is **15th December 2023, 1pm**. By submitting your work, you are acknowledging that it is your own work and that you are aware of both the University’s and the Department’s views on plagiarism. Please follow the guidelines from the Student Handbook (see https://impacs-inter.dcs.aber.ac.uk/images/editorcontent/Documentation/Handbooks/Student_Handbook_20202021_CompSci.pdf) to help you avoid straying from legitimate and desirable cooperation into the area of plagiarism.

3 Task

You are asked to write an essay that considers one of the real-world problems, discusses solving the problem with different machine learning and data science techniques, and contains a comparison/discussion of the different approaches. This is based on a significant literature search/review that you need to perform before you write your essay. The essay should be based on **at least 10 references** that were published between 2014-2023. You should write this essay for a general computer science audience. You can assume that your readers know general computer science concepts and are able to program, however they do not have specialist knowledge in artificial intelligence. To ensure that your essay is in the assignment scope, please send its title to tob45@aber.ac.uk by **27th November 2023, 1pm**.

The structure for your essay is pre-defined as follows. The first section is an introduction that gives a very brief overview of the contents of your essay and describes how you performed the literature search. Explain how you found your sources and how you were able to decide which ones to include. The second section introduces and discusses the problem you selected. The third section discusses how the problem might be solved using machine learning and data science methods. In the fourth section, you will summarise what you conclude and the direction(s) of research you would pursue yourself.

Please do not deviate from this structure!

Since the literature search is a significant part of your essay there will be a list of references (also known as a bibliography). Make sure that you include all sources that you cite in the text. There are specific requirements for your essay that are specified in the next section. Please follow them closely. Also consider the marking scheme to understand what is expected.

4 Requirements

Your essay will contain four clearly marked and numbered sections, with a list of references. The headings and section numbers for the five sections are as follows.

1. Introduction
2. Your selected problem, e.g., *prediction of stock prices*
3. Applications of machine learning and data science techniques
4. Conclusion and way forward

The essay has to be submitted as a single PDF document via Blackboard before the deadline. It needs to have the sections described above and page numbers. For references, please follow the IEEE style, see <https://ieeauthorcenter.ieee.org/wp-content/uploads/IEEE-Reference-Guide.pdf> for further detail. Do not produce a table of contents or a title page. The submission deadline for the report is **15th December 2023, 1pm**.

5 Marks

The essay will be assessed under departmental assessment criteria given in appendix AC of the Student Handbook:

<http://impacs-inter.dcs.aber.ac.uk/images/editor-content/Documentation/Handbooks/Appendices/AppendixAC.pdf>

The marks breakdown is as follows (adding up to 100).

- 10 marks for the introduction,
- 15 marks for the section describing the problem,
- 30 marks for the section describing applications of machine learning and data science techniques,
- 30 marks for the section containing your conclusions and how you would approach the problem,
- 10 marks for references, and
- 5 marks for following the format requirements