

School of Computing, Napier University

Assessment Brief

1. Module number	SET09122/SET09822
2. Module title	Artificial Intelligence
3. Module leader	Ben Paechter
4. Tutor with responsibility for this Assessment	Dimitra Gkatzia (D.Gkatzia@napier.ac.uk)
5. Assessment	Coursework
6. Weighting	30% of module assessment
7. Size and/or time limits for assessment	Up to 1000-1500 words depending on the option. You can additionally include an unlimited number of tables, figures and a reference list.
8. Deadline of submission Your attention is drawn to the penalties for late submission	11.00pm (UK time) 11 December 2020 – Hand in on Moodle
9. Arrangements for submission	Your Coursework must be submitted via Moodle. Further submission instructions are included in the attached specification, and on Moodle
10. Assessment Regulations	All assessments are subject to the University Regulations.
11. The requirements for the assessment	See Attached
12. Special instructions	See Attached
13. Return of work	Feedback and marks will be provided within three weeks of submission.
14. Assessment criteria	Your coursework will be marked using the marking sheet attached as Appendix A. This specifies the criteria that will be used to mark your work. Further discussion of criteria is also included in the coursework specification attached.

Assessment Brief

The assignment aims to cover the learning outcomes specified for the module:

- LO1: Critically reflect on how AI concepts can underpin problem solving tasks
- LO2: Apply the fundamental concepts and origins of artificial intelligence to solve example problems
- LO3: Choose, compare and implement AI based solutions to problem solving tasks making use of appropriate software tools and libraries
- LO4: Solve example problems using AI techniques
- LO5: Evaluate the effectiveness and appropriateness of specific AI techniques for specific applications

The goal of this assignment is to develop and evaluate a sentiment analysis model. Sentiment analysis is the task of natural language processing which aims to predict whether a piece of text is associated with a positive or negative sentiment. There are two options, programming or essay. Each is about the same application described below. Please complete and submit for only ONE of the two options.

Option 1: Programming Assignment

Data

For this assignment you **must** use the IMDB dataset which can be obtained by the keras library as follows:

```
from keras.datasets import imdb
(training_data, training_targets), (testing_data, testing_targets) = imdb.load_data()
```

The tokens in this dataset have been replaced with ids. In order to restore the original text, you can use the following code:

```
index = imdb.get_word_index()
reverse_index = dict([(value, key) for (key, value) in index.items()])
decoded = " ".join( [reverse_index.get(i - 3, "#") for i in training_data[0]] )
print(decoded)
```

Description

Using the **provided** dataset, **develop a sentiment classification model** for the given dataset. Your proposed model **must be a decision tree** with an appropriate text representation method proposed by you. Specifically, you will need to:

- Initially explore the dataset and create two functions that return the unigrams and bigrams of the input data and show the 20 most used unigrams and bigrams.
- Choose and implement a text representation techniques (such as bag of words). Justify your choice.
- Develop a decision tree, which uses as input the text representations from the previous step.
- Evaluate your decision tree by using appropriate metrics. Explain why you chose the selected metrics.

The goal of this exercise is not to produce a state-of-the-art model. If your chosen model performs poorly by your selected metrics, do not worry—this is not what we are testing. It should however be appropriately developed and evaluated (you will be tested on those aspects). Your report should include images, such as your learnt decision tree, and tables with the results.

Tips and Clarifications

If you are struggling to make something work with the volume of data present, you can subsample (for instance, randomly pick a proportion of the dataset). You **must** use Python to tackle this task. You are strongly encouraged to make use of third-party libraries for model building and evaluation, rather than writing your own, unless you specifically need to do something with no library support.

Deadline: Friday 11 December at 11am (UK time).

You will submit:

1. One .pdf file of up to 1000 words excluding tables, references etc. which will contain an overview of your solution, a justification of the chosen text representation approach, evaluation results, a discussion of your results including a critical evaluation. The document should include your matriculation number and relevant titles.
2. The code of your solution as a python or jupyter notebook file.

Marking:

15% for model, 10% for evaluation, 5% for report and reflection. See Appendix A for more explanations.

Option 2: Non-programming Assignment

Domain: For this assignment you will need to propose a sentiment analysis model based on decision trees. Suppose that you have been given access to a dataset with thousands of examples that look like the following:

Sentence	Label
The movie was brilliant	Positive
This is the worst movie I've ever seen	Negative
The actors were amateurs	Negative
Brilliant movie	Positive
The best movie of all times	Positive

Description: Considering the above domain, describe how you would develop a decision tree for sentiment analysis. Specifically:

- Pick an appropriate text representation technique (such as bag of words) and justify your choice.
- Apply your choice to the above examples.
- Explain and show how the tree would be built step by step by including appropriate calculations, tables etc.
- Additionally, you will need to explain what evaluation metric(s) is(are) appropriate for this task and why.

Deadline: Friday 11 December at 11am (UK time).

You will submit:

1. One .pdf file of up to 1500 words addressing the problem described above.

Marking:

15% for the model proposal, 10% for the evaluation metrics, 5% for report and reflection. See Appendix A for more explanations.

For both options

Late submission policy

Coursework submitted after the agreed deadline will be marked at a maximum of 40%.

Coursework submitted over five working days after the agreed deadline will be given 0%.

Extensions

If you require an extension, please contact the module leader **before** the deadline. Extensions are only provided for exceptional circumstances and evidence may be required. See the [Fit to Sit regulations](#) for more details.

Plagiarism

Plagiarised work will be dealt with according to the university's guidelines (Please read - especially if this is the first time in a UK university): <http://www2.napier.ac.uk/ed/plagiarism/>

Appendix A: Marking Scheme (for both options)

	No Submission	Very poor	Inadequate	Adequate	Good	Very good	Excellent	Outstanding
B1 Method / Model 15%	No work submitted	Code with bugs and algorithm / model not well described	Code with bugs but algorithm / model well described	Code with a minor bug but algorithm / model not well described and justified	Code with a minor bug but algorithm / model well described and justified	Code without bugs but algorithm / model not described or justified	Code without bugs but algorithm / model not described and justified in great detail	Code without bugs and algorithm / model described and justified in detail
B2 Evaluation 10%	No work submitted	Not appropriate evaluation metric chosen	Neither the evaluation setup nor the results are described appropriately	Evaluation setup is not justified but almost correctly executed and results are mentioned	Evaluation setup is not justified but correctly executed and results are mentioned	Evaluation setup is somewhat justified and results are somewhat mentioned and discussed	Evaluation setup is somewhat justified but results fully described and discussed	Evaluation setup is justified and results fully described and discussed
B3 Reflection 5%	No work submitted	Results/Proposals not critically described	Not adequate reflection provided	Results/Proposals adequately described.	Average reflection.	Good reflection and explanation of results/proposals.	Very good reflection and explanation of results/proposals.	Excellent reflection and excellent insights of results/proposals.