# MODULE 2 UNIT 3

## Activity submission

**Learning outcome:**

**LO5:** Evaluate the benefits and limitations of machine learning approaches within different contexts.

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| **Plagiarism declaration** |
| **1. I know that plagiarism is wrong. Plagiarism is to use another’s work and pretend that it is one’s own.**  **2. This assignment is my own work.**  **3. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as their own work.**  **4. I acknowledge that copying someone else’s assignment (or part of it) is wrong and declare that my assignments are my own work.** |

### Name:

#### 1. Instructions and guidelines (Read carefully)

##### Instructions

1. Insert your name and surname in the space provided above, as well as in the **file name.** Save the file as: **First name Surname M2 U3 Activity Submission** – **e.g. Lilly Smith M2 U3 Activity Submission.** **NB:** *Please ensure that you use the name that appears in your participant profile on the Online Campus.*

2. Write all your answers in this document. There is an instruction that says, “Start writing here” under each question. Please type your answer there.

3. Submit your assignment in **Microsoft Word only**. No other file types will be accepted.

4. Do **not delete the plagiarism declaration** or the **assignment instructions and guidelines**. They must remain in your assignment when you submit.

**PLEASE NOTE:** **Plagiarism cases will be investigated in line with the Terms and Conditions for participants.**

**IMPORTANT NOTICE:** Please ensure that you have checked your programme calendar for the due date for this assignment.

##### Guidelines

1. There are 6 pages and 1 question in this assignment.

2. Make sure that you have carefully read and fully understood the questions before answering them. Answer the questions fully but concisely and as directly as possible. Follow all specific instructions for individual questions (e.g. “list”, “in point form”).

3. **The assignment must be your own work only.** Do not copy any text from the notes, readings, or other sources without proper attribution. Where you do use material from sources other than your own, make sure that you (1) acknowledge these sources appropriately in the text and (2) provide a list of all references used. (For more information on referencing please also refer to [this guidance](https://www.ox.ac.uk/students/academic/guidance/skills/referencing).)

1. We encourage you to use AI tools to IMPROVE your answer, but please be aware that answers that evidently are solely generated by AI will lead to failing your assignment. If you are unsure how to use AI tools, we suggest refraining from using them until this is covered in the programme.

#### 2. Mark allocation

The question counts 24 marks. However, you will only receive a final percentage mark and will not be given individual marks for the sections of the question. Use the grading rubric to see how marks will be allocated.

#### 3. Question

This question requires you to apply everything that you have learnt about supervised learning. Reflect on the machine learning algorithm that was demonstrated in the two videos of this unit’s 2.8 Screencast series.

Here, an algorithm is used to classify movie reviews as positive or negative, based on the text of the review. This is an example of binary—or two-class—classification, an important and widely applicable kind of machine learning problem.

The training dataset used for this purpose contains the text of 50,000 movie reviews from the Internet Movie Database (IMDB). These are split into 25,000 reviews for training and 25,000 reviews for testing. Here are some examples with label (“0” for negative, and “1” for positive), for reference:

**Review 1:** '"Pandemonium" is a horror movie spoof that comes off more stupid than funny. Believe me when I tell you, I love comedies. Especially comedy spoofs. "Airplane", "The Naked Gun" trilogy, "Blazing Saddles", "High Anxiety", and "Space his film has going for it. Geez, "Scream" had more laughs than this film and that was more of a horror film. How bizarre is that. **(Label=0)**

**Review 2:** 'Great documentary about the lives of NY firefighters during the worst terrorist attack of all time.. That reason alone is why this should be a must see collectors item.. What shocked me was not only the attacks, but the "High Fat Diet" and physical appearance of some of these firefighters. I think a lot of doctors would agree with me that, in the physical shape they were in, some of these firefighters would NOT of made it to the 79th floor carrying over 60 lbs of gear. Having said that I now have a greater respect for firefighters and I realize becoming a firefighter is a life altering job. The French have a history of making great documentaries and that is what this is, a Great Documentary.....'**(Label=1)**

Assume you operate an online sales platform and are planning to apply this type of algorithm to detect negative reviews you receive from your customers. Evaluate whether using the same approach demonstrated for movie reviews could be applied to this context also.

In your response, address the following:

* What are the requirements that need to be in place for the algorithm to classify customer reviews of your products in a reliable way?
* Discuss the limitations of this approach. Mention at least one way in which algorithms of this type could be improved.

Your answer should not exceed 500 words.

Start writing here:

Yes, the approach of using an algorithm to classify movie reviews as positive or negative can be adapted to classify customer reviews on an online sales platform. Following the requirements needed to ensure the algorithm's reliability in this new context:

**Relevant Training Data:** The algorithm needs to be trained on a dataset of customer reviews specifically related to the products sold on the platform.

**Balanced Dataset:** A balanced dataset, with roughly equal numbers of positive and negative reviews.

**Data Preprocessing:** Customer reviews often contain noise such as typos, slang, and abbreviations. Preprocessing steps like tokenization, stemming/lemmatization, stop word removal, and handling negations are essential to clean and standardize the text data.

**Feature Engineering:** The algorithm needs relevant features extracted from the text data.

**Appropriate Model Selection:** Different machine learning models (e.g., Naive Bayes, Support Vector Machines, Logistic Regression, deep learning models) have varying strengths and weaknesses. The choice of model should be based on the characteristics of the data and the desired performance metrics.

**Context Understanding can be a limitation as** algorithms are based on text analysis will struggle with sarcasm, irony, or nuanced language, leading to misclassification [2]. For example, "This is the best product I've ever bought... NOT!" would likely be classified as positive without contextual understanding.

**An improvement would be to** Incorporate techniques like sentiment analysis with aspect-based analysis [1]. This involves identifying the specific aspects of a product being discussed in the review (e.g., battery life, screen quality) and analyzing the sentiment expressed towards each aspect. This provides a more granular and accurate understanding of customer opinions.  
  
**References**:

[1] Fang, X. and Zhan, J., 2015. Sentiment analysis using product review data. *Journal of Big data*, *2*(1), p.5.

[2] Weitzel, L., Prati, R.C. and Aguiar, R.F., 2016. The comprehension of figurative language: What is the influence of irony and sarcasm on NLP techniques?. In *Sentiment analysis and ontology engineering: An environment of computational intelligence* (pp. 49-74). Cham: Springer International Publishing.

#### 5. Rubric

Your Module 2 activity submission will be graded according to the following rubric:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Poor or incomplete** | **Satisfactory to good** | **Very good** | **Exceeds expectations** |
| **Adherence to instructions**  *The response addresses all the points posed in the question, adheres to the instructions, and is within the stipulated word- count limits.* | No submission.  OR  The response fails to address any elements of the assignment.  OR  The machine learning algorithm has not been improved. (0)  OR  The response significantly exceeds the stipulated word-count limit. (0) | The response adheres to some, but not all, of the instructions. Most information provided is irrelevant. (2)  OR  The response slightly exceeds the stipulated word-count limit. (2) | The response sufficiently addresses most of the points in the question and instructions, but not all, and is within the stipulated word-count limit. (3) | The response addresses all the points in the question exceptionally well and is within the stipulated word-count limit. (4) |
| **Evaluation of methods**  *The response provides a nuanced evaluation of the overall system.* | No submission.  OR  The response shows a poor evaluation of supervised learning. (0) | The response is a sufficient attempt at evaluating supervised learning. (2) | The response is a good attempt at evaluating supervised learning. (3) | The response provides an excellent evaluation of supervised learning. (4) |
| **Analysis of Requirements**  *The response provides an appropriate analysis of requirements that demonstrates critical thinking.* | No submission.  OR  The response fails to provide an analysis of requirements. (0) | The response provides an appropriate analysis of requirements.However, it fails to adequately substantiate why the requirements are appropriate. (2) | The response provides an appropriate analysis of requirementsthat is sufficiently substantiated. However, there are small errors in the substantiation. (3) | The response displays an excellent analysis of requirements that need to be in place. (4) |
| **Discuss limitations of the approach**  *The response provides an appropriate analysis of limitations that demonstrates critical thinking.* | No submission.  OR  The response fails to provide a discussion of limitations of the approach. (0) | The response provides an appropriate analysis of the limitations.However, it fails to adequately substantiate why the limitations chosen are appropriate. (2) | The response provides an appropriate analysis of limitationsthat is sufficiently substantiated. However, there are small errors in the substantiation. (3) | The response displays an excellent analysis of limitations of the suggested approach. (4) |
| **Discuss improvements to the approach**  *The response provides an appropriate analysis of improvements that demonstrates critical thinking.* | No submission.  OR  The response fails to provide a discussion of improvements to the approach. (0) | The response provides an appropriate analysis of the improvements.However, it fails to adequately substantiate why the improvements chosen are appropriate. (2) | The response provides an appropriate analysis of improvementsthat is sufficiently substantiated. However, there are small errors in the substantiation. (3) | The response displays an excellent analysis of improvements to the suggested approach. (4) |
| **Clarity and organisation of the writing**  *The response is structured clearly and logically.* | No submission.  OR  The response is unclear, unstructured, and in an incoherent format. (0) | The response is structured sufficiently well in terms of logic, clarity, and brevity. (2) | The response is structured very well in terms of logic, clarity, and brevity. (3) | The response is structured exceptionally well in terms of logic, clarity, and brevity. (4) |

**Total:** 24 marks