MIS780 – Advanced Artificial Intelligence for Business
Trimester 2, 2025
Assessment Task 1 – Data Analysis and Report – Individual

DUE DATE:	**Thursday, 7th August 2025, by 8:00pm (Melbourne time)**
PERCENTAGE OF FINAL GRADE:	**30%**
WORD COUNT:	**Data analysis plus 800 words (1 Jupyter Notebook)**

Description

Purpose

This assignment aims for students to learn how to analyse data related to a business problem and propose artificial intelligence solutions based on machine learning and data mining techniques. The report will discuss and interpret the results. Students will learn to:

- Articulate problems and solutions in business terms.
- Prepare data for different analytics tasks
- Develop and justify sentiment analysis and topic models.
- Assess and report valuable insights to business.

Context/Scenario

Insight IQ is a company specialising in collecting and interpreting data from social channels to support business decisions. As a data analyst working at Insight IQ, you are tasked with analysing a large dataset containing passenger reviews about airlines for one of Insight IQ's top clients, which is a major airline in Australia.

You are provided with a dataset of 74,000 reviews ("A1_dataset.csv" accessible via Cloud Deakin). However, you will conduct the analysis based on a random sample of 50,000 reviews from the provided dataset, unique to your student ID. The code snippet needed to generate the required unique sample based on your student ID is included in the "T2 2025 MIS780 A1 Template.ipynb" file.

Your task is to use Python and Jupyter Notebook on the Google Colab platform to process and explore your sample of 50000 airline reviews from the given dataset. You are to generate insights and provide answers to these questions of interest:

A. Identify the top 10 airlines based on the **overall rating** across various cabin types. Do these airlines consistently rank in the top 10 for **entertainment, food and ground services** as well? Highlight any differences and discuss possible reasons for these variations. Does "Qantas Airways" or "Jetstar Airways" appear in any of the above top 10 lists? Additionally, your client would like to know whether "Qantas Airways" or "Jetstar Airways" is one of the **most recommended (top 10)** or the **least recommended (bottom 10)** airlines for any cabin type.

B. How have overall passenger ratings for **"Qantas Airways"** changed over time compared to the **top 5** rated airlines? Are there any noticeable trends or patterns in the variation of overall ratings over time for "Qantas Airways" and the other top five-rated airlines? Discuss any possible factors that may have influenced the above trends.

C. Compare the overall sentiments expressed by customers about airlines. Which airline received the most positive sentiments?

D. Identify the airline that received the most positive sentiment for their Economy class and Business Class "service/s".

E. What are the concerns and interests of passengers when flying with an airline?

F. What are the differences in concerns and interests between passengers flying on the top three-rated airlines and the bottom three-rated airlines? Explain potential reasons for these differences. *Note: you can use reviews by the top three-rated airlines together and the bottom three-rated airlines together for the analysis.*

Task and Deliverables:

- **Executive Summary**: Define your problem in business terms and present your proposed approaches. Present your major findings and explain how they help to address the business problem. Cross-reference other report sections for support.
- **Data Exploration**: Process and explore the characteristics of the attributes in the provided dataset. Use tables or figures to support your answers to questions (A) and (B).
- **Sentiment analysis**: Use sentiment analysis to answer questions (C) and (D).
- **Topic modelling**: Use text-processing techniques to process and prepare textual data for topic modelling. Use Latent Dirichlet Allocation (LDA) to explore topics discussed in the text reviews. Carry out experiments and demonstrate how an appropriate topic number is determined for your model. Interpret the discovered topics and answer questions (E) and (F). (Hint: *Use Part-of-Speech tagging to extract only nouns for topic modelling. Remove highly frequent/infrequent words for meaningful topic discovery*.)
- **Practical implication**: Based on the discovered insights from your analysis, provide recommendations to your client on how to better support passengers.

NOTE: *Write code that is efficient in both time and space. Make sure the code is clear and easy to understand, using meaningful variable names and comments where needed. Only print or display essential outputs that are important for understanding, and minimise unnecessary printing or displaying of large data structures or intermediate outputs.*

You are allowed to use any sample code provided in the lab materials or online resources. However, you must modify/customise such sample code to your own assignment (e.g. rename variables, labels, titles; restructure code flow, modify chart types, colour and symbols). References and citations must be provided where appropriate.

Learning Outcomes

This task allows you to demonstrate your achievement towards the Unit Learning Outcomes (ULOs) which have been aligned to the Deakin Graduate Learning Outcomes (GLOs). Deakin GLOs describe the knowledge and capabilities graduates acquire and can demonstrate on completion of their course. This assessment task is an important tool in determining your achievement of the ULOs. If you do not demonstrate achievement of

the ULOs you will not be successful in this unit. You are advised to familiarise yourself with these ULOs and GLOs as they will inform you on what you are expected to demonstrate for successful completion of this unit.

The learning outcomes that are aligned to this assessment task are:

Unit Learning Outcomes (ULOs)	**Graduate Learning Outcomes (GLOs)**
ULO 1: Appraise the suitability of major artificial intelligence and advanced machine learning concepts to solve business problems ULO 2: Design and develop artificial intelligence solutions for multifaceted business problems	GLO1: Discipline-specific knowledge and capabilities GLO5: Problem solving

Submission

See CloudDeakin for more info about this assignment, especially the assignment template and the assessment rubric.

The assignment must be prepared using the provided assignment template *(.ipynb* file) using Jupyter Notebook. Your assignment should contain all necessary codes and be ready to run. If you use any new Python package, ensure that you include the installation code in your *.ipynb* file. All Python codes should be ready to execute without any further modification on Google Colab. Any submission without an executable .ipynb file will not be marked.

Upon completion of the assignment, execute all Python codes and then generate a PDF file. Your files should be named as your firstname_lastname_MIS780A1 *(e.g. John_Smith_MIS780A1.pdf and John_Smith_MIS780A1.ipynb).* You are to submit your assignment (both the PDF file and the source .ipynb file) in the individual Assignment Dropbox in the MIS780 CloudDeakin unit site on or before the due date. Do **NOT** zip the files. Any submission contained in a zip file will not be marked.

Submitting a hard copy of this assignment is not required. You must keep a backup copy of every assignment you submit until the marked assignment has been returned to you. In the unlikely event that one of your assignments is misplaced you will need to submit your backup copy.

Any work you submit may be checked by electronic or other means to detect collusion and/or plagiarism and for authenticating work.

When you submit an assignment through your CloudDeakin unit site, you will receive an email to your Deakin email address confirming that it has been submitted. You should check that you can see your assignment in the Submissions view of the Assignment Dropbox folder after uploading and check for, and keep, the email receipt for the submission.

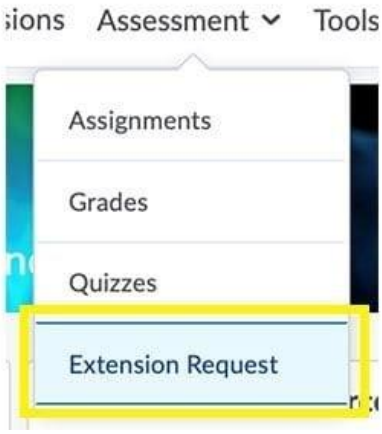
Marking and feedback

The marking rubric indicates the assessment criteria for this task. It is available in the CloudDeakin unit site in the Assessment folder, under Assessment Resources. Criteria act as a boundary around the task and help specify what assessors are looking for in your submission. The criteria are drawn from the ULOs and align with the GLOs. You should familiarise yourself with the assessment criteria before completing and submitting this task.

Students who submit their work by the due date will receive their marks and feedback on CloudDeakin **15 working days** (3 weeks) after the submission date.

Extensions

Extensions can only be granted for exceptional and/or unavoidable circumstances outside of your control. Requests for extensions must be made by 12 noon on the submission date using the online Extension Request form under the Assessment tab on the unit CloudDeakin site. All requests for extensions should be supported by appropriate evidence (e.g., a medical certificate in the case of ill health).



Applications for extensions after 12 noon on the submission date require University level special consideration and these applications must be must be submitted via StudentConnect in your DeakinSync site.

Late submission penalties

If you submit an assessment task after the due date without an approved extension or special consideration, 5% will be deducted from the available marks for each day after the due date up to seven days*. Work submitted more than seven days after the due date will not be marked and will receive 0% for the task. The Unit Chair may refuse to accept a late submission where it is unreasonable or impracticable to assess the task after the due date. *'Day' means calendar day for electronic submissions and working day for paper submissions.

An example of how the calculation of the late penalty based on an assignment being due on a Thursday at 8:00pm is as follows:

- 1 day late: submitted after Thursday 11:59pm and before Friday 11:59pm– 5% penalty.
- 2 days late: submitted after Friday 11:59pm and before Saturday 11:59pm – 10% penalty.
- 3 days late: submitted after Saturday 11:59pm and before Sunday 11:59pm – 15% penalty.
- 4 days late: submitted after Sunday 11:59pm and before Monday 11:59pm – 20% penalty.
- 5 days late: submitted after Monday 11:59pm and before Tuesday 11:59pm – 25% penalty.
- 6 days late: submitted after Tuesday 11:59pm and before Wednesday 11:59pm – 30% penalty.
- 7 days late: submitted after Wednesday 11:59pm and before Thursday 11:59pm – 35% penalty.

The Dropbox closes the Thursday after 11:59pm AEST time.

Support

The Division of Student Life provides a range of **Study Support** resources and services, available throughout the academic year, including **Writing Mentor** and **Maths Mentor** online drop ins and the SmartThinking 24

hour writing feedback service at **this link**. If you would prefer some more in depth and tailored support, **make an appointment online with a Language and Learning Adviser**.

Referencing and Academic Integrity

Deakin takes academic integrity very seriously. It is important that you (and if a group task, your group) complete your own work in every assessment task Any material used in this assignment that is not your original work must be acknowledged as such and appropriately referenced. You can find information about referencing (and avoiding breaching academic integrity) and other study support resources at the following website: http://www.deakin.edu.au/students/study-support

Use of Generative Artificial Intelligence (genAI) in this assessment

Deakin welcomes the opportunity to engage with emerging technologies in education and seeks to build your capability in the **ethical** and **responsible** use of current and emergent technology. Deakin also upholds a commitment to academic integrity and to ensuring high-quality educational outcomes that prepare you for an AI-driven future.

Using genAI as an assistant is appropriate in this assessment task.

To support your learning in this assessment task, it is recommended that you limit genAI use to assist with specific tasks such as **troubleshooting errors in your code and *editing your work to identify grammatical and spelling errors*.** You must modify any AI-generated content you use. Your final submission should be your own work and show how you have used your own critical thinking skills and what you have learnt in this unit.

It is important that you take responsibility for your final submission, including:

- **Evaluating the accuracy and quality** of any genAI generated material.
- **Acknowledging how you used genAI** tools in this assessment to ensure you are making informed decisions about your learning, demonstrating learning you have gained in the unit, and acting with integrity.
- Please use the **Acknowledgement statements** to guide how you acknowledge the use of genAI in this assessment.

Your rights and responsibilities as a student

As a student you have both rights and responsibilities. Please refer to the document ***Your rights and responsibilities as a student*** in the Unit Guide & Information section in the Content area in the CloudDeakin unit site.