Assessment 3 Information

Subject Code:	**DATA5000**
Subject Name:	Artificial Intelligence Programming in Business Analytics
Assessment Title:	**AI-Driven Embeddings for Enhanced Retail Customer Insights**
Assessment Type:	Report Writing, questionnaire Completion and Practical Python Programming
Weighting:	40% Individual
Total Marks:	40
Submission:	Submit a report via Turnitin Zip other files and submit them via Dropbox Complete the questionnaire
Due Date:	Tuesday 11:55 pm Week 13

Assignment Overview

In this assignment, you will utilise AI-driven techniques for document retrieval and similarity analysis to derive business insights. You will work with vector databases, LLMs (Large Language Models), and cosine similarity to analyse and recommend improvements for an industry scenario.

You will:

1. Complete the provided Python code (fill in missing parts).
2. Answer a multiple-choice questionnaire.
3. Analyse the results and provide a business recommendation.

Industry Scenario: AI-Powered Market Intelligence for E-commerce

You are working for a data-driven e-commerce company that sells consumer electronics. The company wants to improve customer experience and product recommendations using AI-driven search and analytics.

The company has:

- Product descriptions, customer reviews, and support documents in multiple formats (PDF, DOCX, and XLSX).
- A search system where users want contextually relevant product recommendations.
- A similarity system that helps analyse customer reviews and product descriptions to improve product categorisation.

Your Tasks:

- Implement document storage and retrieval using ChromaDB.
- Perform cosine similarity analysis to compare customer reviews and product descriptions.
- Utilise an LLM (like LLAMA or GPT-Neo) to enhance search results using RAG (Retrieval-Augmented Generation)

Assessment Instructions

- Assessment resources will be made available to you on Monday of Week 11
- The questionnaire will be available Monday 10:00 am W11- Friday 5 pm (AEST) Week 12.

Part 1: Complete the Python Code (10 Marks)

- Complete the Python notebook by filling in the gap.
- Create a markdown, write down your name and student number

Part 2: Business Analytics Questionnaire (5 Marks)

Based on the results of your AI-powered document retrieval, cosine similarity analysis, and AI-generated recommendations, answer 10 multiple-choice questions.

These questions are designed to test your business analytics thinking and ability to interpret data-driven insights.

- The questionnaire will be available Monday 10:00 am W11- Friday 5 pm (AEST) Week 12.
- Once students start the questionnaire, they will have 30 minutes to complete 10 multiple-choice questions.
- You will enter the “Attempt Questionnaire” on MyKBS in the Assessment Table for A3.
- Answer 10 multiple-choice questions.
- The questionnaire can only be attempted once.
- Backtracking of questions is not allowed. You must complete the question before moving on to the next one. You will not be able to go back to the previous question.

Part 3: Business Analytics Report Task – 1200 words (25 Marks)

Your report should be structured as a professional business analytics document intended for senior management and key stakeholders. Ensure a data-driven approach, use tables where necessary, and include actionable insights.

1. Executive Summary (on a single page) - 100 words, 2 marks
- Brief overview of the analysis conducted.
- Key findings from document retrieval, similarity analysis, and AI-driven recommendations.
- Business impact of implementing AI-driven insights.

2. Business Context and Problem Statement – 100 words, 2 marks
- Describe the business challenge that this analysis aims to address.
- Explain why enhancing product search, customer sentiment analysis, and AI-powered

recommendations is important for the company.
- Use a realistic business scenario, such as:
  - Low product conversion rates due to ineffective search functionality.
  - Mismatch between customer expectations and product descriptions.
  - Poor alignment between marketing messaging and customer sentiment.

3. Data Analytics Process - 300 words (divided into 3.1 & 3.2), 6 marks
Explain the methodology used to derive business insights from the AI-powered analytics.

3.1 Document Retrieval and Vector Search Analysis
- Process Explanation: How were documents (product descriptions, customer reviews, and business reports) stored and retrieved using vector search and ChromaDB?
- Results Interpretation: What documents were retrieved when querying the database? Provide a table of retrieved documents and explain their relevance.

3.2 Cosine Similarity Analysis for Customer Sentiment
- Objective: Measuring alignment between customer reviews and product descriptions to detect gaps in product positioning.
- Results Presentation: Provide a table of cosine similarity scores between customer reviews and product descriptions.
- **Insights:**
  - **High Similarity (0.8 - 1.0):** Product descriptions are aligned with customer expectations.
  - **Medium Similarity (0.5 - 0.8):** Some disconnects in customer perception and official messaging.
  - **Low Similarity (0.0 - 0.5):** Potential issues with how products are marketed or perceived.

Product	Customer Review	Cosine Similarity Score	Business Interpretation
iPhone 15 Pro	"Great battery life, but design is bulky."	0.87	Well-aligned, minor design concerns.
Samsung S24	"AI-powered camera is good, but too expensive."	0.79	Price concerns may impact sales.
Google Pixel 8	"Camera software needs improvement."	0.55	Expectation gap in software features.

4. AI-Generated Business Insights (RAG) - 150 words, 3 marks
- How did the AI model (LLAMA) assist in product insights?
- Compare AI-generated insights with vector-based search results.
- Evaluate if AI-generated responses improved decision-making.
- Provide an example of AI-generated business recommendations based on retrieved documents.

5. Business Recommendations for Stakeholders – 350 words, 8 marks

Use diagrams/visual charts to explain your recommendations

Using your findings, propose **three to five actionable recommendations** for different business functions:

5.1 Product Development Team

- Improve product descriptions for items with low similarity scores to better align with customer sentiment using AI.
- Adjust product messaging based on AI-driven review sentiment insights.

5.2 Marketing Strategy

- Use AI insights to refine advertising copy for better engagement.
- Develop targeted marketing strategies focusing on highly rated product features.
- Address pricing concerns identified in customer reviews.

5.3 Customer Experience & Support

- Implement AI-powered product search enhancements to improve customer experience.
- Train support teams to proactively address issues identified in AI-driven insights.
- Use AI-driven chatbots to answer customer questions using RAG-based document retrieval.

6. Business Impact Analysis –100 words, 2 marks

- Revenue Impact: How will aligning descriptions and customer sentiment affect conversion rates?
- Operational Efficiency: How does using AI reduce manual effort in customer support and marketing?
- Competitive Advantage: How does AI-driven retrieval help in gaining an edge over competitors?

7. Conclusion and Next Steps – 100 words, 2 marks

- Summarise how AI-powered analytics enhances business decision-making.
- Recommend further AI integration to improve forecasting, demand analysis, and competitor benchmarking.
- Suggest future A/B testing of AI-driven content enhancements.

Submission Requirements for Assessment 3

1. Submit the completed Notebook with the required markdowns and any other additional files via Dropbox
2. Complete the questionnaire
3. Submit a professional Word document (.docx) report via Turnitin.
    I. The report must be 1200 words (at least 1000 words and not exceeding 1400), properly structured with headings, subheadings, tables, and business insights.
    II. Ensure clear, actionable recommendations for senior business stakeholders.

Important Study Information

Academic Integrity and Conduct Policy

https://www.kbs.edu.au/admissions/forms-and-policies

KBS values academic integrity. All students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Academic Integrity and Conduct Policy.

Please read the policy to learn the answers to these questions:

- What is academic integrity and misconduct?
- What are the penalties for academic misconduct?
- How can I appeal my grade?

Late submission of assignments (within the Assessment Policy)

https://www.kbs.edu.au/admissions/forms-and-policies

Number of days late	Penalty
1* - 9 days	5% per day for each calendar day late deducted from the total marks available.
10 - 14 days	50% deducted from the total marks available.
After 14 days	Assignments submitted more than 14 calendar days after the due date will not be accepted and the student will receive a mark of zero for the assignment(s) unless special consideration, reasonable adjustment or an alternative factor related to compassionate circumstances is approved and applied.

**Assignments submitted at any stage within the first 24 hours after the deadline will be considered to be one day late and therefore subject to the associated penalty.*

Length Limits for Assessments

Penalties may be applied for assessment submissions that exceed prescribed limits.

Study Assistance

Students may seek study assistance from their local Academic Learning Advisor or refer to the resources on the MyKBS Academic Success Centre page. Further details can be accessed at https://elearning.kbs.edu.au/course/view.php?id=1481

Generative AI Traffic Lights

Please see the level of Generative AI that this assessment has been designed to accept:

Traffic Light	Amount of Generative Artificial Intelligence (GenerativeAI) usage	Evidence Required	This assessment (✓)
Level 1	**Prohibited:** **No GenerativeAI allowed** This assessment showcases your individual knowledge, skills and/or personal experiences in the absence of Generative AI support.	The use of generative AI is **prohibited** for this assessment and may potentially result in penalties for academic misconduct, including but not limited to a mark of zero for the assessment.	
Level 2	**Optional:** **You may use GenerativeAI for research and content generation that is appropriately referenced.** ***See assessment instructions for details*** This assessment allows you to engage with Generative AI as a means of expanding your understanding, creativity, and idea generation in the research phase of your assessment and to produce content that enhances your assessment. I.e., images. **You do not have to use it.**	The use of GenAI is **optional** for this assessment. Your collaboration with GenerativeAI **must be clearly referenced** just as you would reference any other resource type used. **Click on the link below to learn how to reference GenerativeAI.** **https://library.kaplan.edu.au/referencing-other-sources/referencing-other-sources-generative-ai** In addition, you **must** include an appendix that documents your GenerativeAI collaboration including all prompts and responses used for the assessment. Unapproved use of generative AI as per assessment details during the content generation parts of your assessment may potentially result in penalties for academic misconduct, including but not limited to a mark of zero for the assessment. Ensure you follow the specific assessment instructions in the section above.	✓
Level 3	**Compulsory:** **You must use GenerativeAI to complete your assessment** ***See assessment instruction for details*** This assessment fully integrates Generative AI, allowing you to harness the technology's full potential in collaboration with your own expertise. Always check your assessment instructions carefully as there may still be limitations on what constitutes acceptable use, and these may be specific to each assessment.	You will be **taught how** to use generative AI and assessed on its use. Your collaboration with GenerativeAI **must be clearly referenced** just as you would reference any other resource type used. **Click on the link below to learn how to reference GenerativeAI.** **https://library.kaplan.edu.au/referencing-other-sources/referencing-other-sources-generative-ai** In addition, you **must** include an appendix that documents your GenerativeAI collaboration including all prompts and responses used for the assessment. Unapproved use of generative AI as per assessment details during the content generation parts of your assessment may potentially result in penalties for academic misconduct, including but not limited to a mark of zero for the assessment. Ensure you follow the specific assessment instructions in the section above.	

Marking Guide

Part 1: Python Notebook execution (10 Marks)

Category	Fail (0-49%)	Pass (50-64%)	Credit (65-74%)	Distinction (75-84%)	High Distinction (85-100%)
1. Complete the Python Code (10 Marks)	(0-0.49)	(5-6.4)	(6.5-7.4)	(7.5-8.4)	(8.5-10)
Code Completion	Code is incomplete or incorrect.	Partially completed with errors.	Mostly complete but lacks efficiency or clarity.	Well-structured and functional code with minor issues.	Fully completed, well-optimized, and correctly executed code.
Markdown Documentation	No markdown provided.	Markdown included but lacks key details.	Includes name and student number but lacks clarity.	Well-documented with clear name and student number.	Clear and well-structured markdown with additional documentation.

Part 2: Business Analytics questionnaire (5 Marks) – marked by computer through Moodle awarding 0.5 marks for each correctly chosen answer.

Part 3: AI-Powered Analytics Report (25 Marks)

Category	Fail (0-49%)	Pass (50-64%)	Credit (65-74%)	Distinction (75-84%)	High Distinction (85-100%)
1. Executive Summary (2 Marks)	(<1)	(1)	(1.5)	(1.75)	(2)
Overview of Analysis	No summary provided.	Basic overview with minimal depth.	Provides a summary but lacks key insights.	Clearly summarises key findings concisely.	Highly effective, well-structured summary with strong business impact.
Key Findings & Business Impact	No mention of findings or impact.	Mentions findings but lacks clarity.	Identifies key findings but lacks strong business alignment.	Effectively highlights key findings and their business relevance.	Clearly articulates high-value insights with business impact.
2. Business Context and Problem Statement (2 Marks)	(<1)	(1)	(1.5)	(1.75)	(2)
Business Challenge	No problem statement provided.	Problem identified but lacks explanation.	Clearly defines the problem with some justification.	Well-explained business challenge with context.	Strong, strategic problem definition with business implications.
Importance of AI-Powered Insights	No discussion on AI relevance.	Mentions AI but lacks depth.	Explains AI benefits with limited business relevance.	Clearly connects AI-powered insights to business needs.	Strategically justifies AI-powered insights with strong business rationale.
3. Data Analytics Process (6 Marks)	(<3)	(3)	(4)	(5)	(6)
3.1 Document Retrieval and Vector	(<1.5)	(1.5)	(2)	(2.5)	(3)

Search Analysis (3 Marks)					
Explanation of Process	No explanation of methodology.	Basic explanation without clarity.	Outlines methodology but lacks technical detail.	Clearly explains methodology with supporting evidence.	Provides a detailed, well-structured technical explanation.
Interpretation of Retrieved Documents	No results or discussion.	Provides results but lacks relevance.	Shows results with basic interpretation.	Clearly interprets results with supporting evidence.	In-depth analysis of retrieved documents with insightful business implications.
3.2 Cosine Similarity Analysis for Customer Sentiment (3 Marks)	(<1.5)	(1.5)	(2)	(2.5)	(3)
Objective & Measurement	No discussion of cosine similarity.	Mentions cosine similarity but lacks explanation.	Explains cosine similarity with some relevance.	Clearly defines the objective and analysis.	Strongly justifies the approach with well-documented insights.
Presentation of Results	No results presented.	Provides results but lacks clarity.	Shows results with basic interpretation.	Effectively interprets results with relevant insights.	Well-structured results analysis with strong business implications.
4. AI-Generated Business Insights (3 Marks)	(<1.5)	(1.5)	(2)	(2.5)	(3)
AI Model Application	No discussion of AI usage.	Mentions AI model but lacks clarity.	Discusses AI insights but lacks depth.	Clearly explains AI-generated insights.	Provides a well-documented, strategic application of AI findings.
Comparison with Vector-Based Search	No comparison provided.	Basic comparison without insight.	Provides a comparison but lacks business relevance.	Effectively compares AI and vector search insights.	Strong comparative analysis with business decision-making insights.
AI-Generated Business Recommendations	No recommendations provided.	Basic recommendations with limited AI alignment.	Provides recommendations but lacks strategic depth.	Clearly connects AI-generated insights to actionable recommendations.	Strong, data-driven AI-generated recommendations that align with business objectives and drive impactful decisions.
5. Business Recommendations for Stakeholders (8 Marks)	(<4)	(4)	(5)	(6-7)	(8)
Product Development Recommendations	No recommendations provided.	Basic recommendations with limited AI alignment.	Provides recommendations but lacks strategic depth.	Clearly connects AI insights to actionable recommendations.	Provides strong, data-driven recommendations supported by AI-driven sentiment analysis to refine product descriptions and improve customer alignment.
Marketing Strategy Recommendations	No marketing recommendations provided.	Basic marketing recommendations without AI insight.	Provides reasonable marketing recommendations.	Strong marketing strategy aligned with AI insights.	Highly strategic, AI-driven marketing recommendations incorporating targeted advertising, customer sentiment trends, and competitive pricing adjustments.

Customer Experience & Support	No customer experience suggestions.	Basic suggestions with limited impact.	Provides relevant suggestions with some justification.	Strong customer-focused recommendations using AI insights.	Comprehensive AI-driven enhancements, including chatbot support, proactive customer service interventions, and improved AI-powered product search for enhanced customer experience.
6. Business Impact Analysis (2 Marks)	(<1)	(1)	(1.5)	(1.75)	(2)
Revenue Impact	No revenue discussion.	Mentions revenue but lacks analysis.	Provides basic revenue discussion.	Clearly explains how aligning product descriptions and customer sentiment can improve conversion rates.	Strong financial justification demonstrating the direct impact of AI-driven sentiment analysis on revenue growth.
Operational Efficiency & Competitive Advantage	No discussion of operational impact.	Mentions efficiency but lacks detail.	Discusses operational impact with limited evidence.	Clearly outlines how AI automation reduces manual effort in customer support and marketing.	Provides a comprehensive analysis of how AI improves operational efficiency and establishes a competitive advantage through AI-driven retrieval and decision-making.
7. Conclusion and Next Steps (1 Mark)	(0-0.49)	(0.5-0.64)	(0.65-0.74)	(0.75-0.84)	(0.85-1)
Summary of AI-Powered Analytics	No summary provided.	Basic summary without insights.	Provides a reasonable summary of AI applications.	Clearly summarises how AI-powered analytics enhances business decision-making.	Highly effective summary demonstrating AI's strategic role in optimising business decisions.
Recommendations for Further AI Integration	No recommendations provided.	Provides minimal recommendations.	Suggests AI improvements but lacks justification.	Recommends further AI integration to enhance forecasting, demand analysis, and competitor benchmarking.	Offers highly strategic and forward-thinking AI recommendations, including future A/B testing for AI-driven content enhancements.

Note 1: A penalty will be imposed if any part of the assessment is deemed by the assessor where it shows an over-reliance on AI-generated content in your answer. There needs to be a demonstration of original thought.

If you want to challenge the penalty awarded based on Note 1, your assessment will be submitted to Academic Integrity for a second opinion and further investigations.