ALBUKHARY INTERNATIONAL UNIVERSITY

CCS3153 NATURAL LANGUAGE PROCESSING
SEMESTER 1 2024/2025

ASSIGNMENT

A. CLO/PLO ASSESSEMENT

This assignment will cover the following CLO(s) and PLO(s)

1. CLO2 : Analyse techniques in machine learning to solve specific problems in NLP (C4, PLO2).
2. CLO3: Build practical NLP applications (P4, PLO6).

B. ASSIGNMENT TASK

This is a **group assignment** with a maximum of three students per group. Each group must produce two deliverables: **(i) a written report and (ii) an program/application demonstration.** Students are required to develop a Python-based program to perform sentiment analysis.

Sentiment analysis is a method used text analytics to systematically recognize, extract, measure, and examine emotional states and subjective information. Sentiment analysis is often used to determine the speaker or writer's attitude or overall polarity towards a particular issue.

In this assignment, your task is to perform sentiment analysis regarding certain topic/objects based on collected data sets and evaluate the sentiment patterns based on the obtained sentiment scores. **The dataset used must be from recent 5 years**. Consider the following ideas and **SELECT ONE TOPIC** for your assignment:

(i) Determine the polarity of the sentiment such as positive, negative and neutral of public opinion regarding certain issues/event/service/product/objects.

(ii) Determine the ranking of customer/public opinion regarding certain issues/event/service/product/objects such as very good, good, average, bad or very bad.

(iii) Determine the more fine-grained sentiment or more specific categories, for example, sentiments might be rated on a scale of 1 to 5, where 1 represents very negative and 5 represents very positive.

(iv) Determine specific emotional states conveyed in the text, such as joy, anger, sadness, surprise, fear, and disgust.

(v) Comparing sentiments between different entities or across different documents. For example, analyzing customer reviews to compare sentiments about two competing products or brands.

(vi) Any other sentiment analysis-related tasks.

Your assignment should be **PRECISE AND CONCISE**, and must include the followings:

(1) Data Collection & Task Description (CLO2)

- Collects publicly available corpus (plain textual data) for objects/topics/events and each object/topics/event must have sufficient textual data/data set to perform the sentiment analysis. Please ensure that the data collected do not have copyright issues.
- In the beginning of your assignments, give brief introduction regarding the corpus that you used in this assignment, objective and the scope of your sentiment analysis task.

(5 marks)

(2) Framework Design (CLO2)

- Given the data and the objectives of the project, **implement at least TWO (2) machine learning techniques** for the task.
- Describe the process in designing your analytical model for sentiment analysis. The description may include pre-processing method, feature engineering method in NLP, classification algorithm, optimization/hyperparameter tuning (if related) and evaluation method or any other related process that will be implemented.
- The description **MUST BE CLEAR AND ACCURATE**, which can be in text or in graphical representation such as flow-chart.

(20 marks)

(3) Implementation/Coding (CLO3)

- Using Python, implement a sentiment analysis system based on the framework described in section (2) and perform an appropriate evaluation. Your implementation must adhere strictly to the specifications outlined in section (2).
- Additionally, your code should include functionality to produce graphical representations of the evaluation results. Ensure that execution results are documented and included in your report.
- Note that application deployment or interface development is optional.

(30 marks)

(4) Demonstration of the NLP Application (CLO3)

- You are required to prepare and deliver a demonstration of your application.
- Test your application with suitable input data to ensure the application works as intended without errors. This will showcase your understanding of NLP concepts, the implementation of techniques, and the practical relevance of your project.
- Groups that successfully deploy their application will receive additional marks.

(20 marks)

(5) Evaluation and Analysis (CLO2)

- Select at least 2 appropriate graphical representation (such as graphs, scatterplots, boxplot etc.) to visualize the sentiment scores/result.

- Also, include at least one graphical representation for exploratory data visualization in your answer as well. Write your own analysis based on visualization from the selected graphical representation.
- **Compare, interpret and critically analyze the result of both ML method**, investigate the anomalies and produce a conclusion.

(25 marks)

Rubrics for the assessment is shown in the Appendix 1. Please refer the rubrics and include all the elements stated to gain high marks.

C. SUBMISSION INSTRUCTIONS

(1) Report Submission Due Date: **11 JANUARY 2026 (11:59 PM)**

(2) Deliverables:
- Reports must include task (1), (2), (3) and (5). Maximum pages are 10 pages, not including the Appendix.
- The codes (.ipynb file etc) from task (3) must be included in the Appendix
- Include sample dataset in the Appendix
- Demonstration will be conducted face-to-face during the laboratory sessions.

(3) This assignment must be submitted **BY GROUP.** Pleas ensure the names of all group members are included in the report.

(4) Submission must be through AIU e-Learning Portal.

(5) Demonstration session will be at **Week 11.**

D. LATE POLICY

Submission after the due time without having been granted an extension by your lecturer, will mean that your work is 'late.' Late work will have a penalty of 20% of the total possible marks deducted from the mark that your work is worth, per day (including weekends).

E. PLAGIARISM POLICY

Please confirm that the work you are submitting is your own and has not been written by anyone else (by filling in the plagiarism statement on the last page of this specification). Whilst you may collaborate with others in studying and use source codes from the internet to help you in implementing the tasks. Submitted work copied from or written jointly with others is not acceptable. Any two or more similar submissions will be considered as copying, and your mark will be deducted by a severe penalty.

This is an individual assignment and the corpus used in this assignment **MUST BE DIFFERENT** with any other groups. However, similar type and source of data is allowed as long as the corpus used in this assignment is not completely similar with any other groups.

APPENDIX 1

ASSESSMENT RUBRICS

Assessment Criteria	Allocated Marks	Marks					Weightage	Total Marks
		0-1	2	3	4	5		
PART I – FULL REPORT (CLO2, PLO2, C4)								
Data Collection and Task Description	**5**	Insufficient description of objective and scope of the task were stated. Selected objects/ topics/ events are inappropriate for the task and/or the collected textual data is **could not be used to build analytical model**.	Insufficient description of objective and scope of the task were stated. Selected objects/ topics/ events are inappropriate for the task and/or the collected textual data is **not sufficient to build analytical model**.	The objective and scope of the task were moderately stated, yet understandable. Selected objects/ topics/ events are suitable for the assignment and/or the collected textual data is **sufficient to build analytical model**.	A good and clear description of objective and scope of the task were stated. Selected objects/ topics/ events are suitable for the assignment and/or the collected textual data is **sufficient to build good analytical model**.	An excellent description of objective and scope of the task were stated. Selected objects/ topics/ events are suitable and the collected textual data is **more than sufficient and contained well-balanced data to build ideal analytical model.**	**1**	
Design Framework	**20**	**Only 1 ML algorithm is selected. Lack of description regarding** pre-processing method, feature engineering method (if related), classification algorithm, evaluation method or any other process implemented, which reflect the **student's poor understanding** regarding the concept of designing analytical model.	**Only 1 ML learning algorithm is selected. Brief description is provided** regarding pre-processing method, feature engineering method (if related), classification algorithm, evaluation method or any other process implemented, which reflect the **student's fair understanding** regarding the concept of designing analytical model.	**2 ML algorithm are selected. Clear and brief description are provided** regarding pre-processing method, feature engineering method (if related), classification algorithm, evaluation method or any other process implemented, which reflect the **student's good understanding** regarding the concept of designing analytical model.	**2 suitable ML algorithms are selected. Clear and good description and justification are provided** regarding pre-processing method, feature engineering method (if related), classification algorithm, evaluation method or any other process implemented, which reflect the **student's very good understanding** regarding the concept of designing analytical model.	**More than 2 suitable ML algorithm are selected. Precise and concise description and justification are provided** regarding pre-processing method, feature engineering method (if related), classification algorithm, evaluation method or any other process implemented, which reflect the **student's excellent understanding** regarding the concept of designing analytical model.	**4**	

Method of visualization	**5**	Provide minimum of 1 appropriate graphical representation for exploratory data visualization OR evaluation of sentiment analysis result, which is relevant for critical analysis.	Provide at less than 3 appropriate graphical representation for exploratory data visualization and evaluation of sentiment analysis result, which is relevant for critical analysis.	Provide at least 3 appropriate graphical representation for exploratory data visualization and evaluation of sentiment analysis result, which is relevant for critical analysis.	Provide appropriate and sufficient number of graphical representations for exploratory data visualization and evaluation of sentiment analysis result, which is very relevant for critical analysis.	Great consideration and extra number of graphical representations for exploratory data visualization and evaluation of sentiment analysis result, which is significantly relevant for critical analysis.	**1**	
Result Interpretation and Analysis	**20**	Demonstrate poor ability to interpret and discuss the classification result based on selected graphical representation. Produce weak analysis, with unclear correlation between the classification result with the designed model or the data characteristics of the data set. No investigation of anomalies is conducted.	Demonstrate fair ability to interpret and discuss the classification result based on selected graphical representation. Able to somewhat correlate the classification result with the behavior of designed model and the data characteristics of the data set. Investigation of the anomalies is done with unclear analysis.	Demonstrate good ability to interpret and discuss the classification result based on selected graphical representation. Able to correlate the classification result with the behavior of designed model and the data characteristics from the exploratory data analysis. Also, able to investigate the anomalies from the evaluation result.	Demonstrate very good ability to interpret and discuss the classification result based on selected graphical representation. Able to produce valid correlation of classification result with the behavior of designed model and the data characteristics from the exploratory data analysis. Also, able to investigate the anomalies from the evaluation result.	Demonstrate excellent ability to interpret and discuss the classification result based on selected graphical representation. Able to precisely correlate the classification result with the behavior of designed model and the data characteristics from the exploratory data analysis. Also, able to thoroughly investigate the anomalies from the evaluation result.	**4**	
PART II – CODING & EXECUTION/DEMONSTRATION (CLO3, PLO6, P4)								
1. Coding	**10**	**Poor program coding** that partially/not meet the specifications stated in the framework. All elements described are poorly coded in the program.	**Fair program coding** that meets most of specifications stated in the framework. All elements described are moderately coded in the program.	**Good program coding** that meets the level of specifications stated in the framework. All elements described are coded in the program.	**Very good program coding** that meet the high level of specifications stated in the framework. All elements described are finely coded in the program.	**Excellent program coding** that meets the high level of specifications stated in the framework. All elements described are precisely coded in the program.	**2**	
2. Complexity of the Model Design	**20**	Attempts overly simplistic approaches with little understanding of NLP techniques.	Applies basic NLP techniques, such as bag-of-words or TF-IDF, without additional enhancements.	Implements standard NLP techniques but lacks complexity or integration of advanced methods.	Applies moderately complex NLP techniques or combines multiple methods effectively	Integrates complex NLP techniques (e.g. word embeddings, semantic analysis etc) effectively.	**4**	

3. Demonstration Quality	**10**	Presentation is unstructured, lacks clarity, and provides little to no explanation of the application; uses some test case to demonstrate the program, and produce wrong output.	Presentation is unstructured, lacks clarity, and provides little to no explanation of the application; uses some test case to demonstrate the program, and produce some correct output.	Demonstration is loosely structured, partially explains the application, and uses few examples or test cases; some points are unclear or poorly communicated. Able to produce correct output.	Demonstration is structured and explains the application effectively, though it lacks engagement or depth in some areas; adequate use of the test case and produce correct and labelled output	Demonstration is well-structured, engaging, and clearly explains the application's purpose, functionality, and technical aspects; excellent use of test case examples and produce accurate and well-organized/labelled output.	**2**	
4. Application Functionality	**10**	The application is non-functional or fails to demonstrate the intended features.	The application is partially functional, struggles with some inputs, or has noticeable errors.	The application is mostly functional, handles most inputs well, but shows minor issues or inaccuracies	The application is functional, handles a intended inputs effectively, and demonstrates accuracy.	The application is fully functional, handles a variety of inputs effectively, and demonstrates robustness and accuracy.	**2**	