Assessment Tool for
AI 312 - Natural Language Processing

The course assesses SO3 and SO6.

SO3: Communicate effectively in a variety of professional contexts.			
KPI #	KPI	KPI Elements	Assessment Method
3.1	Communicate Effectively in Writing in a variety of professional contexts.	Use language and tone appropriate for the intended audience.	Project report
		Express ideas clearly in a suitable style (e.g. organized with Correct use of grammar, spelling, and punctuation).	
		Use added-value visual aids (e.g., graphs, charts, and diagrams) Defend ideas using properly cited and reliable sources.	
		Convey ideas clearly in a suitable style, using well-organized structure and correct language (e.g. grammar and spelling)	
3.2	Communicate Effectively Orally in a variety of professional contexts.	Present ideas and important outcomes within time limits	Project presentation
		Use added-value visual aids (e.g., tables, figures, videos, etc.).	
		Demonstrate effective use of body language (e.g., confidence, voice tone, voice volume, eye contact, etc.).	
		Respond correctly to the audience's questions.	

SO6: Apply AI theory and techniques to produce computing-based solutions			
KPI #	KPI	KPI Elements	Assessment Method
6.1	Selection of AI techniques to produce computing-based solutions	Explain foundational AI theories, including machine learning and neural networks.	Exam question
		List different advanced AI techniques.	
		Select AI techniques for a specific computing-based problem.	
6.2	Apply AI techniques to produce computing-based solutions.	Implement AI techniques to produce computing-based solutions.	Project demo & code
		Evaluate AI techniques.	

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AI 312: Natural Language Processing

Course Project

1. Overview:

The focus of this semester's project is to **design and develop an NLP-based machine learning project**. Students will work in groups to build an **end-to-end NLP solution** that addresses a real-world problem using **various NLP techniques**.

Objectives:

- Identify a **real-world NLP problem** and define its scope.
- Collect and preprocess **textual datasets** for training and evaluation.
- Implement and compare different **NLP techniques**.
- Evaluate the system's performance using **standard NLP metrics**.
- Present the results through **a well-documented report and an interactive demo**.

2. Project Structure:

Students will complete the project in groups of **3-4 members**, following a **milestone-based development** process:

Milestones

- **M1: Problem Definition & Data Collection (Week 5-7)**
  - Choose an NLP problem (e.g., sentiment analysis, text classification, chatbots, summarization).
  - Identify and collect relevant datasets (open-source datasets or self-collected data).
  - Conduct background research and review **existing NLP methods**.
  - Submit a **one-page proposal** defining the problem, dataset, and expected outcomes.
- **M2: Initial Model Implementation (Week 8-10)**
  - Perform **data preprocessing** (tokenization, stopword removal, stemming, lemmatization).
  - Implement a **baseline NLP model** using different representations such as Bag-of-Words, TF-IDF, or Word2Vec-based representation.
  - Train the model on the dataset and analyze initial results.
  - Document **methodology and preprocessing** techniques.

- **M3: Model Evaluation & Refinement (Week 11-13)**
  - Optimize model performance by using **advanced NLP techniques** (e.g., Transformers, LSTMs).
  - Perform **error analysis** and fine-tune hyperparameters.
  - Evaluate the system using **accuracy, precision, recall, and F1-score**
  - Compare results from different models and justify improvements.

- **M4: Final Demo & Presentation (Week 14)**
  - Finalize the system and optimize code for efficiency.
  - Prepare a **final technical report** covering all project details.
  - Create a **demo showcasing the working NLP system**.
  - Deliver a **presentation**, explaining project implementation, results, and challenges.

3. Project Deliverables

By the end of the project, each group must submit the following:

1. **One-Page Proposal (10%)**
   - Problem statement, dataset details, objectives, expected challenges.
2. **Project Report (20%)**
   - Problem definition and background research.
   - Dataset details and preprocessing steps.
   - Explanation of implemented NLP techniques.
   - Model training, evaluation, and error analysis.
   - Performance comparison and future improvements.
3. **Source Code (30%)**
   - Well-documented, structured code with execution instructions.
   - Implementation of multiple NLP techniques for comparison.
4. **Demo & Presentation (40%)**
   - Live demo showcasing model functionality.
   - Well-structured presentation explaining the approach and findings.
   - Interactive Q&A session to assess understanding.

4. Project Ideas & Example Topics:

- Fake News Detection, Hate Speech Detection, Spam Filtering
- Product Reviews Analysis, Social Media Sentiment Classification
- Customer Service Chatbot, FAQ Bot for University Queries
- Resume Parser, Legal Document Tagging, Disease Recognition from Medical Text
- News Article Summarization, Automatic Lecture Notes Generator
- English-to-Arabic Translation using Transformers
- Meeting Transcription, Keyword Spotting in Audio

5. Grading Criteria:

Component	Percentage	SOs
Problem Selection	10% (2)	-
Project Report	20% (4)	SO 3.1
Source Code	30% (6)	SO 6.2
Presentation & Demo	40% (8)	SO 3.2 SO 6.2

The Project will assess the following **Artificial Intelligence Program Student Outcomes Rubrics for AI312 (SO3 and SO6)**

SO3: Communicate effectively in a variety of professional contexts.							
KPI #	KPI	KPI Elements	EE	ME	NI	US	NA
3.1	Communicate Effectively in Writing in a variety of professional contexts.	1. Use language and tone appropriate for the intended audience. 2. Express ideas clearly in a suitable style (e.g. organized with Correct use of grammar, spelling, and punctuation). 3. Use added-value visual aids (e.g., graphs, charts, and diagrams) Defend ideas using properly cited and reliable sources. 4. Convey ideas clearly in a suitable style, using well-organized structure and correct language (e.g. grammar and spelling)					
3.2	Communicate Effectively Orally in a variety of professional contexts.	1. Present ideas and important outcomes within time limits. 2. Use added-value visual aids (e.g., tables, figures, videos, etc.). 3. Demonstrate effective use of body language (e.g., confidence, voice tone, voice volume, eye contact, etc.). 4. Respond correctly to the audience's questions.					

SO6: Apply AI theory and techniques to produce computing-based solutions							
KPI #	KPI	KPI Elements	EE	ME	NI	US	NA
6.2	Apply AI techniques to produce computing-based solutions.	1. Implement AI techniques to produce computing-based solutions. 2. Evaluate AI techniques.					