

# ITNPAI3 Artificial Intelligence for Natural Language Processing

## Assignment 1

Deadline: 26<sup>th</sup> February, 2026

AIAS Level: Level 2 AI Planning

In this assignment, you will build a sentiment analysis model by exploring two different classification approaches and comparing them. The dataset can be downloaded from here:

<https://www.kaggle.com/datasets/abhi8923shriv/sentiment-analysis-dataset>

This assignment consists of several tasks, which are outlined below:

**Task 1:** Adapt preprocessing techniques specifically for sentiment analysis.

- In your report: Justify preprocessing choices in relation to sentiment analysis

**Task 2:** Extract features from the data using two feature extraction methods: Bag-of-Words and TF-IDF

- In your report: Discuss which representation better captures sentiment and why

**Task 3:** Train two different statistical classifiers of your choice (either the ones covered in the lecture, or any other classifier excluding neural network-based classifiers)

- In your report: Evaluate both models, and report the results in a table, and discuss the results

**Task 4:** Analyse several misclassified examples by conducting an error analysis

- In your report: Identify common error types (e.g. negation, mixed sentiment, sarcasm), explain why these errors are difficult for models to resolve

Please submit your code (in .ipynb) along with a short report (in .pdf, maximum 1,000 words) explaining the theoretical background and the results obtained from your model. The report should be formatted in Calibri, 12-point font.

### AIAS Level 2

The use of AI-based tools is permitted for brainstorming, idea generation, and general guidance. However, you are expected to make independent decisions regarding model selection, implementation, and evaluation. Any code, analysis, or conclusions submitted must reflect your own understanding and work. Over-reliance on AI tools for final decisions or direct copying of outputs without comprehension is not permitted and may be subject to academic integrity policies. You must submit the AI coversheet alongside your report and code.

## Marking rubric

### Distinction (70–100)

The submission demonstrates a strong and confident understanding of sentiment analysis and NLP techniques.

- Well-structured and commented code
- Model choices, feature extraction methods, and preprocessing decisions are clearly and convincingly justified
- Alternative approaches are acknowledged and thoughtfully discussed
- Results are well interpreted, with clear insight into what the models are learning
- Error analysis shows linguistic and analytical depth (e.g. awareness of negation, ambiguity, sarcasm)
- The report is clear, well structured, and reproducible, written in a professional academic style

### Merit (60–69)

The submission demonstrates a solid understanding of sentiment analysis using NLP.

- Generally well-written code but lacks comments or description
- Appropriate modelling and feature extraction choices are made, with reasonable justification
- Results are correctly reported and generally interpreted, though with limited depth
- Some error analysis or reflection is present but may lack detailed insight
- The report is clear overall, with only minor issues in structure or explanation

### Pass (50–59)

The submission shows **basic understanding** of NLP methods applied to sentiment analysis.

- Poorly written code with no comments
- The pipeline is mostly implemented correctly but choices are largely described rather than justified
- Results are reported with minimal interpretation
- Error analysis is superficial or generic
- The report is understandable but may lack clarity or coherence in places

### Marginal Fail (40–49)

The submission fails to demonstrate adequate understanding of sentiment analysis or NLP.

- Errors in the code
- Major errors in methodology or interpretation
- Inappropriate or unjustified model and feature choices
- Little evidence of analysis, reflection, or understanding

- Report is poorly written, disorganised, or incomplete

**Clear Fail (0–39)**

Zero or very little attempt at the submission. Code is provided with no report. Report is submitted with no code.