**Assignment Problem:**

The task is to perform sentiment analysis on the IMDb dataset using natural language processing techniques. The dataset, comprising movie reviews and corresponding sentiment labels, is initially loaded into a pandas dataframe.

**Solution Approach:**

Data Acquisition: Reviews and corresponding labels were loaded from 'reviews.txt' and 'labels.txt', respectively.

Data Splitting: The dataset was split into training, validation, and test sets using the train\_test\_split function from scikit-learn.

Text Representation: The reviews were transformed into Bag-of-Words (BoW) representations using a CountVectorizer with a maximum of 10,000 most frequent words.

Neural Network Training: A neural network with a single hidden layer was defined and trained using TensorFlow and Keras. The model was compiled with the Adam optimizer and binary crossentropy loss.

Performance Evaluation: The model's performance was evaluated on the test set, achieving a test accuracy of approximately 87.56%.

**Algorithms Used:**

CountVectorizer: Used for text representation, converting reviews into BoW representations.

Neural Network: Implemented with a single hidden layer and sigmoid activation for sentiment classification.

**Performance:**

The final model, a neural network trained on BoW representations, achieved a test accuracy of 87.56%, demonstrating its effectiveness in sentiment classification.

**Reflection on Learning Outcome:**

This assignment provided a hands-on experience in natural language processing and sentiment analysis. Key takeaways include data preprocessing, feature extraction, and the application of neural networks for text classification. The exploration of BoW representations and the iterative process of tuning hyperparameters contributed to a deeper understanding of machine learning techniques. Additionally, the ability to interpret and visualize the impact of individual words on predictions enhanced insights into the workings of the model. Overall, the assignment facilitated practical learning and problem-solving in the context of sentiment analysis.