NLU course projects: Lab. 6 (SA)

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1. Introduction

This report contains the work done to solve the **SA task**, in particular to implement a model based on Pre-trained Language model for the **Aspect Based Sentiment Analysis (ABSA)** task regarding the extraction of the aspect terms only. *Aspect-Based Sentiment Analysis (ABSA)* is a fine-grained form of sentiment analysis that focuses on identifying the sentiment or opinion associated with specific aspects or features of an entity within a text. Unlike traditional sentiment analysis, which provides an overall sentiment, ABSA breaks down sentiment by specific "aspects" or "attributes" (e.g., "camera" in a review of a phone). This allows for a more detailed understanding of what people like or dislike about particular attributes within products, services, or topics [1] [2].

2. Implementation details

To solve the task, a pre-trained Language model based on BERT was implemented. Most of the methods used are the ones from the assignment 2 (NLU), just slightly adapted. The used model (*ABSAmodel*) is almost the same, just with one linear head layer. Some effort was done in order to create a dataset class suitable for the task in which, again, tokenization plays a central role for transforming text into model-compatible formats. To allow sentiment labels to be indexed precisely, with each sentiment label mapped to its corresponding token index, following [3] (as for assignment 2), the implemented solution uses the tokenizer from `AutoTokenizer` [4]. It permits to map tokens back to their original words through the `word_ids()` function [5]. To ensure alignment between each original word and its tokenized pieces, preserving the token-to-word mapping, word IDs are tracked so that tokens corresponding to a single word are properly grouped, while subword tokens are marked accordingly. This mapping helps retain the original sequence structure within the tokenized text, allowing the model to link back predictions to specific words effectively.

The used dataset is the Laptop partition of SemEval2014 task 4. The loss is the cross-entropy. The performance were evaluated under 5 runs of 100 epochs each, using AdamW as optimizer, with a learning rate of 0.0001.

3. Results

For the evaluation the official scripts from [6] have been moderately adapted. The reported metrics are F1, Precision and Recall. The model, based on BERT-base-uncased and using a small dropout of 0.1, can achieve good performance in aspect-based sentiment analysis. The precision and recall values demonstrate a high level of accuracy in identifying relevant sentiments while also effectively capturing the majority of actual positive instances and the F1 score suggests that the model performs consistently across different classes without favoring one over the other.
Table 1 shows the obtained results.

Architecture	F1 micro	Precision	Recall
ABSAmodel	**0.939** $\pm$ 0.023	**0.94** $\pm$ 0.023	**0.94** $\pm$ 0.023

Table 1: *Part 1 Results. The terms in **bold** indicate the best performance obtained for the corresponding configuration.*

4. References

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