NLU project exercise lab: 11

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1. Introduction

In the first part of the exercise, after obtaining the data I needed and preprocessing it, I calculated the accuracy of the model in classifying class subjectivity.
Next, I obtained the data on sentence polarity by training my model.
In a final step, I used the first model to remove all sentences classified as objective, and perform only in a second step the model on polarity on the remaining sentences.
The goal was to observe how accuracy values varied before and after making these changes to the sentences, as well as to be able to build models that obtained good performance values regardless.
In the second part of the exercise, I performed the first delivery, concerning the extraction of aspect terms, with the relative calculation of accuracy and other evaluation metrics.

2. Implementation details

2.1. Part 1

The data were preprocessed through tokenization and, after being split into train and test data, were vectorized for use within the various computational models. Below are all the outputs that are produced:

- SUBJECTIVITY - Accuracy with no K-fold: an initial assessment regarding the subjectivity of the sentences, calculated without the use of the k-fold technique. This assessment may be disregarded as it is used only as an initial reference point;
- SUBJECTIVITY - All sentences: the accuracy assessment regarding the subjectivity of all sentences in the dataset, without any removal at this stage. A k-fold mode with 5 splits was used in this calculation;
- POLARITY - All sentences: evaluation of accuracy regarding the polarity of sentences in the new dataset. Again, a k-fold mode with a number of splits equal to 5 was used;
- POLARITY - Without objective sentences: in this last evaluation the sentences classified as objective by the first evaluated model were removed from the dataset and, again through a k-fold of 5 splits, their accuracy was evaluated.

The suggested number of splits to be used was 10. However, I decided to decrease this number to 5 because of the high computational time that 10 splits required.

2.2. Part 2

In this part of the project, after obtaining the necessary data, I created a dictionary containing aspect terms. Then I split the data into training data and test data, processing and tokenizing them. Finally, I built my MLPClassifier model for predicting aspect terms. This was used after vectorizing the tokenized data and defining the labels through a MultiLabelBinarizer.

3. Results

3.1. Part 1

The following table shows the accuracy results obtained in Part 1 of this project.

Data and Model evaluated	Mean Accuracy
SUBJECTIVITY - No k-fold	0.880
SUBJECTIVITY - All sentences	0.877
POLARITY - All sentences	0.899
POLARITY - Without objective sentences	0.868

Although the results can all be considered satisfactory, as they achieve a high accuracy value, it is noted that, through the project, it would have been reliable to observe an increase in the accuracy of the last model over the previous one.
Instead, the values are very similar to each other, with very little deviation in the negative towards the last model. It can be established that, from the obtained models, no substantial change was obtained between the complete dataset of sentences and the one from which all sentences classified as objective were instead removed.

3.2. Part 2

The accuracy obtained from this model and other evaluation metrics are collected in the following tables:

Metric	Result
Accuracy	0.934

Label	Precision	Recall	F1-Score	Support
0	1.00	1.00	1.00	800
1	0.97	0.96	0.97	760

As can be seen from the table, the accuracy value is very high, as are the other evaluation metrics. This could mean that patterns in the data are easily recognizable for the constructed model, however, this could imply the risk of overfitting on the training data.