CheckThat! 2024

Task 2

Detecting subjectivity in sentences from news articles

Introduction

Problem definition:

- binary classification
- given dataset
- language english
- Goal: create system that reliably classifies sentences from news articles as either subjective or objective

Data

There are four datasets given:

- train_en.tsv (Columns: sentence_id, sentence, label, solved_conflict)
  830 samples, 36% SUBJ 64% OBJ, solved_conflict == True for 69 samples
- dev_en.tsv (Columns: sentence_id, sentence, label, solved_conflict)
  219 samples, 52% SUBJ 48% OBJ, solved_conflict == True for 20 samples
- dev_test_en.tsv (Columns: sentence_id, sentence, label)
  243 samples, 52% SUBJ 48% OBJ
- test_en.tsv (Columns: sentence_id, sentence)
  484 samples

Data

- train_en.tsv is used as a training dataset
- dev_en.tsv is used as a testing dataset
- dev_test_en.tsv is used as a validation dataset
- test_en.tsv is used for the final evaluation and the leaderboard

Preprocessing

The following steps are applied to preprocess the data:

- convert to lowercase
- replace quoted sentences with <quote>
- remove links
- remove usernames
- tokenize
- replace numbers with <num>
- remove special charachters except for ! and ?
- remove stopwords that don’t contain any info about subjectivity
- lemmatize

Feature engineering

The following features are extracted:

- TF-IDF vectorizer. **Idea:** so the model can learn which words co-occur with which class. -> Might have not been the best choice.
- Word2Vec (pretrained google-news-300) for each word in given sentence. **Idea:** so the model can find similarities in the semantics for the two classes.
- Embeddings from SBERT transformer. **Idea:** extract the semantics of sentences. More complex than Word2Vec and also takes context of words into account.
- A feature selection of all the features out of Word2Vec and SBERT is done using only the k most meaningful features. Chi^2 is used to rank these features. **Idea:** filter out noisy/not important features.

Model Selection

The following models were tried out and evaluated using the f1 macro:

- Logistic Regression Classifier
- SVM
- Random Forest
- Gradient Boost
- A simple Neural Network

=> Logistic Regression Classifier and SVM proofed to be the most promising models.

Parameter Tuning

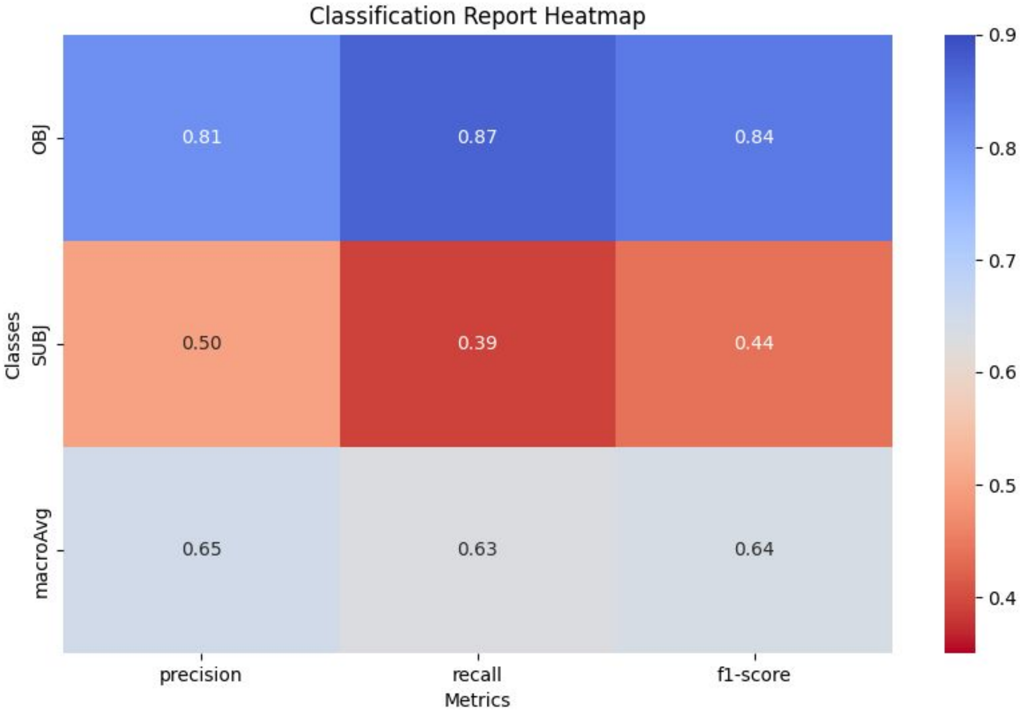
The parameters were tuned using bayesian optimization on the following hyperparameters:

- For Logistic Regression: C, solver and number of selected features
- For SVM: C, kernel, degree, gamma, coef0 and number of selected features

In the end, to avoid overfitting a Logistic Regression Classifier with the standard parameters was used since the best parameter-tuned model was only slightly better (f1 macro of 0.7076 vs 0.6983).

Results

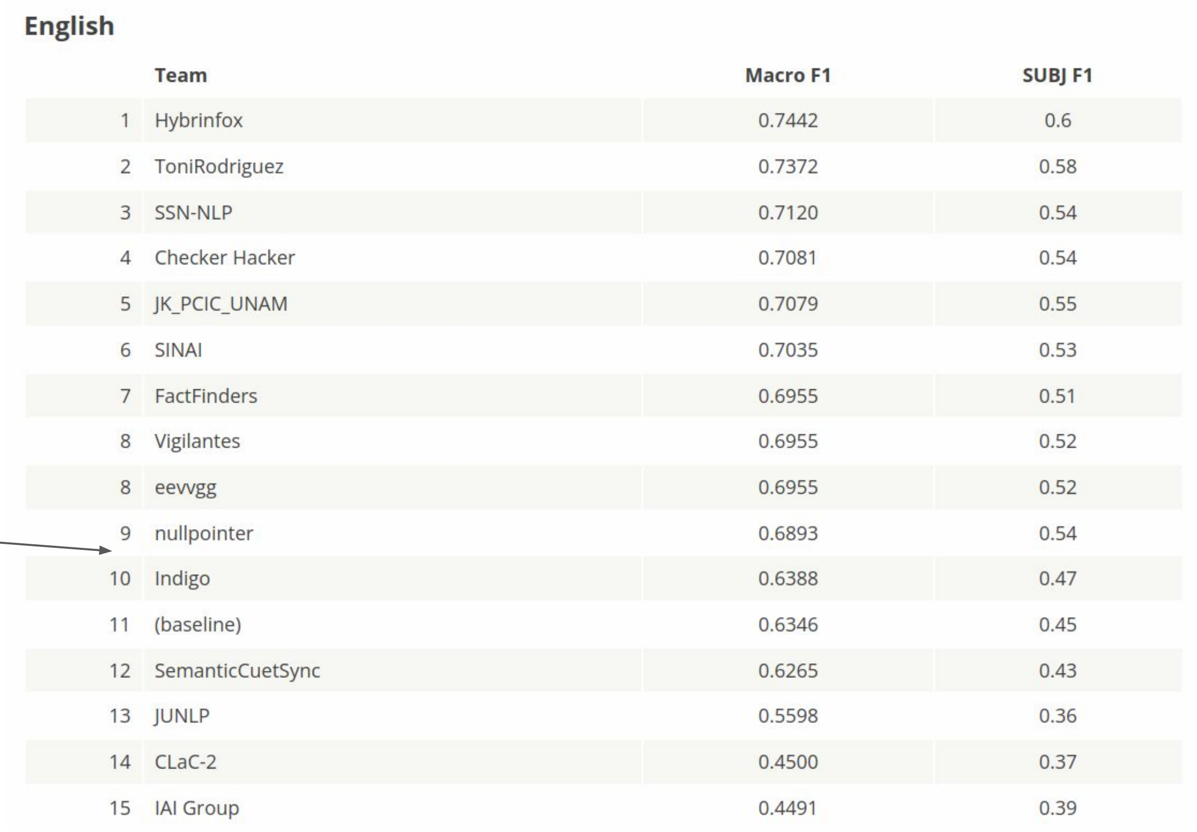
Note: 3 times as many samples are OBJ than SUBJ



Leaderboard

Place 10 out of 16

Macro F1: 0.6389
SUBJ F1: 0.44

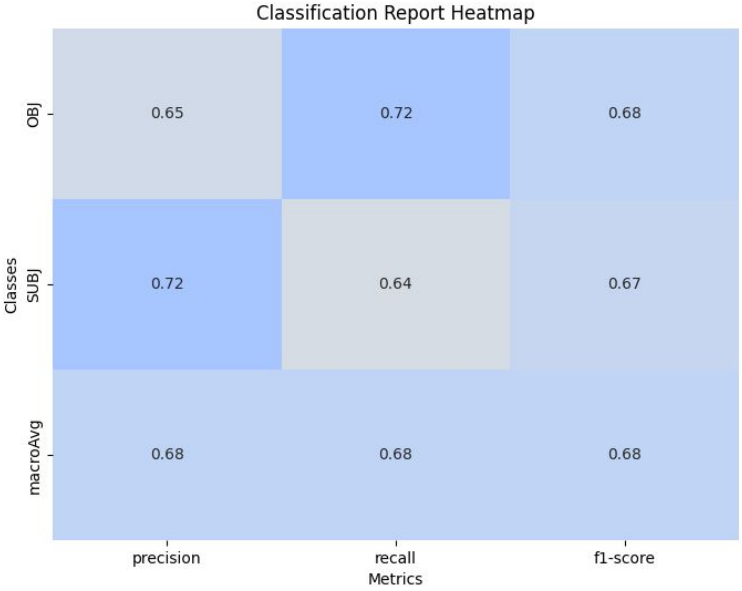


English

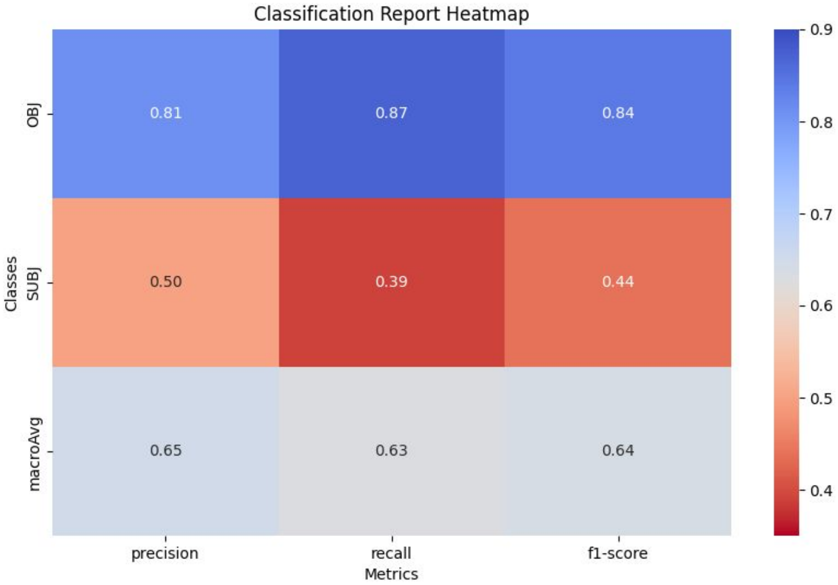
	Team	Macro F1	SUBJ F1
1	Hybrinfox	0.7442	0.6
2	ToniRodriguez	0.7372	0.58
3	SSN-NLP	0.7120	0.54
4	Checker Hacker	0.7081	0.54
5	JK_PCIC_UNAM	0.7079	0.55
6	SINAI	0.7035	0.53
7	FactFinders	0.6955	0.51
8	Vigilantes	0.6955	0.52
8	eevvgg	0.6955	0.52
9	nullpointer	0.6893	0.54
10	Indigo	0.6388	0.47
11	(baseline)	0.6346	0.45
12	SemanticCuetSync	0.6265	0.43
13	JUNLP	0.5598	0.36
14	CLaC-2	0.4500	0.37
15	IAI Group	0.4491	0.39

Interpretation of Results

validation set



final evaluation set



Note: both datasets were only run once

Interpretation of Results

- the performance on the validation set is only a bit worse than on the final evaluation set (f1 macro of 0.68 vs 0.70) -> therefore there is likely no overfitting
- in general bad performance for SUBJ -> not enough SUBJ samples in trainset
- low SUBJ recall and low OBJ precision -> samples should be classified as SUBJ more often
- very unbalanced performance for the final prediction set this is also a contrast to performance on the evaluation set -> maybe set contains new patterns (espacially for SUBJ class) that were not seen before

How to fix these issues?

- Not enough SUBJ samples in trainset?
  - use data augmentation
- System classifies as SUBJ too seldom?
  - over-/undersampling
  - find the right threshold of the model with roc curve
- There are still unknown patterns?
  - join train and test set together and use cross validation
  - use data augmentation
  - use different features to detect new patterns in existing data

Summary

- the system is already good at the classification of sentences but there is still room for improvement
- it can already greatly assist humans at this task
- it struggles with identifying some cases of subjectivity
- but has potential to improve with more data