Deep Learning for Natural Language Processing

Elias Wendt, 2754066
Laura Boyette, 2271837

TECHNISCHE UNIVERSITÄT DARMSTADT

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Task 1: Task1

1.2 LSTM:

Model Summary:

```
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
embedding_1 (Embedding)      (10, 124, 50)             20000100
_________________________________________________________________
dropout_1 (Dropout)          (10, 124, 50)             0
_________________________________________________________________
lstm_1 (LSTM)                (10, 124, 100)            60400
_________________________________________________________________
dropout_2 (Dropout)          (10, 124, 100)            0
_________________________________________________________________
time_distributed_1 (TimeDist (10, 124, 45)             4545
=================================================================
Total params: 20,065,045
Trainable params: 64,945
Non-trainable params: 20,000,100
_________________________________________________________________
```

Bi-LSTM

Model Summary:

```
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
embedding_1 (Embedding)      (10, 124, 50)             20000100
_________________________________________________________________
dropout_1 (Dropout)          (10, 124, 50)             0
_________________________________________________________________
bidirectional_1 (Bidirection (10, 124, 200)            120800
_________________________________________________________________
dropout_2 (Dropout)          (10, 124, 200)            0
_________________________________________________________________
time_distributed_1 (TimeDist (10, 124, 45)             9045
=================================================================
Total params: 20,129,945
Trainable params: 129,845
Non-trainable params: 20,000,100
_________________________________________________________________
```

1.3 LSTM: The final val_categorical_accuracy is 0.7485. Macro F1 is 0.3853.
BiLSTM: The final val_categorical_accuracy is 0.7889. Macro F1 is 0.5127.

1.4 a) Compared to the categorical accuracy, the macro F1 metric is better suited for data sets with class imbalances – due to harmonic mean – which also takes false classifications into account.

b) New macro-F1 score:
lstm: 0.38551031458146595
bilstm: 0.5127049313841296

1.5 Config 1:

- hidden_units: 1000
- batch_size: 20
- dropout: 0.3
- f1 macro on dev: 0.639136
- f1 macro on test: 0.638346

Config 2:

- hidden_units: 1000
- batch_size: 50
- dropout: 0.2
- f1 macro on dev: 0.614883
- f1 macro on test: 0.614324

Config 2:

- hidden_units: 200
- batch_size: 20
- dropout: 0.7
- f1 macro on dev: 0.464712
- f1 macro on test: 0.462979