Citation Intent Classification

Identifying the Intent of a Citation in scientific papers

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Task Description

- Identifying intent of a citation in scientific papers
- Three Intent categories/classes from the data set
  1. background (background information)
  2. method (use of methods/tools)
  3. result (comparing results)
- **Classification Task**
  - Assign a discrete class (intent) for each data point

Data set

- Training Data: 8.2K+ data points
  1. background - 4.8K
  2. method - 2.3K
  3. result - 1.1K
- Testing Data: 1.8K data points
  1. background - 1K
  2. method - 0.6K
  3. result - 0.2K

Approach & Architecture

Classifier Implementation

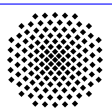
Base Classifier: **Perceptron**

- Linear Classifier
- Binary Classifier

```
class Perceptron:
    def __init__(self, label: str, weights: dict, theta_bias: float)
    def score(self, features: list)
    def update_weights(self, features: list, learning_rate: float, penalize:
    ↪  bool, reward: bool)

class MultiClassPerceptron:
    def __init__(self, epochs: int,learning_rate: float,random_state: int)
    def fit(self, X_train: list, labels: list)
    def predict(self, X_test: list)
```

- **Parameters** and **Hyperparameters**




Approach & Architecture

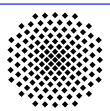
Feature Representation

Lexicons and Regular Expressions ($\approx$ 30 Features)

- LEXICONS

```
ALL_LEXICONS = {
    'INCREASE': ['increase', 'grow', 'intensify', 'build up', 'explode'],
    'USE': ['use', 'using', 'apply', 'applied', 'employ', 'make use'],
    .....
}
```

- REGEX
  - *ACRONYM*
  - *CONTAINS_URL*
  - *ENDS_WITH_ETHYL*



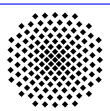

Evaluation of the Classifier
F1 Score

- F1 Score
  - weighted average of Precision and Recall

```
def f1_score(y_true, y_pred, labels, average)
```

- Averaging
  - MACRO
  - MICRO
  - None

- Why MACRO and MICRO ?




Model Performance

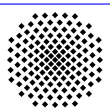
Results

Averaging	Score
MICRO	0.64
MACRO	0.57
background	0.72
method	0.54
result	0.46

Table: F1-Score Results

Next Steps

- Better Feature Representation - Word Embeddings
  - word2vec
  - BERT
  - ELMo
  - ...
- Better Classifier (Non-Linear / Neural Networks)
  - BiRNNs
  - BiLSTMs
  - CNNs
  - ...
- Interaction with other groups




Thanks for listening