Investigating the Impact of Syntactic Features for Semantic Dependency Parsing

Maximilian Pfundstein

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Linköpings University

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Introduction

Introduction | Research Question

- Syntatic and Semantic Dependency Parsing (SDP)
- Acyclic Graphs
- Research Question: To what extend does predicted syntax help for semantic dependency parsing?

- Theoretical baseline model by Dozat and Manning [Zeman et al., 2017]
- Implementation by Daniel Roxbo [Roxbo, 2019]
- Extension to learn syntactic graphs

Semantic Only	Gold Syntax	Predicted Syntax
93.6%	97.1%	92.8%

Table 1: Semantic F_1 scores.

- Multitask Learning
- Presumption by [Kurtz et al., 2019] shows that there might be an information overlap
- Other research shows, that multitask learning might help [Peng et al., 2017]

Overview

Overview | Objectives

- Allow to import the data from the `.conllu` format
- Increase the performance during the pre-processing by using caching to save computation time
- Implement multitask learning to simultaneously learn syntactic and semantic graphs and investigate the results

Objectives

Objectives | Import `.conllu`

- Separate files for syntax (`.cpn`) and semantic (`.sdp`)
- Combined file format CoNLL-U from [Buchholz and Marsi, 2006]

Objectives | Performance Improvement

- Preprocessing is conducted every time the source code is being invoked
- Main functions:
  - `parse_conllu_labels`
  - `parse_conllu_sentences`
  - `parse_conllu_targets`

Objectives | Multitask Learning

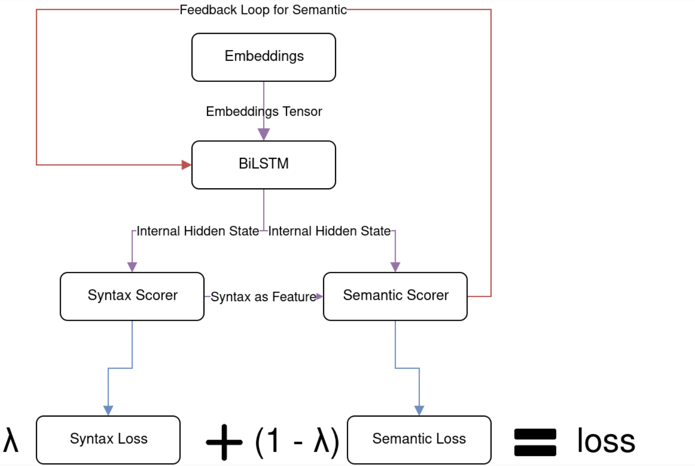
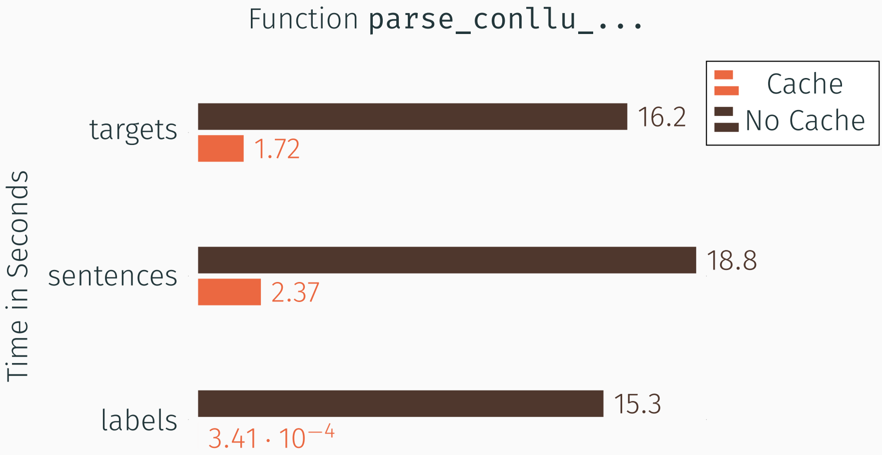


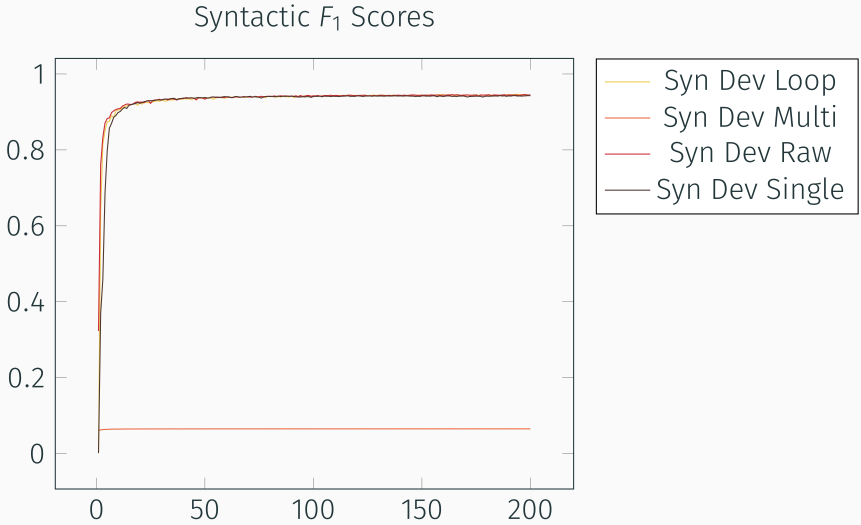
Figure 1: Flowchart, with red representing the feedback loop.

Results

Results | Performance Improvement

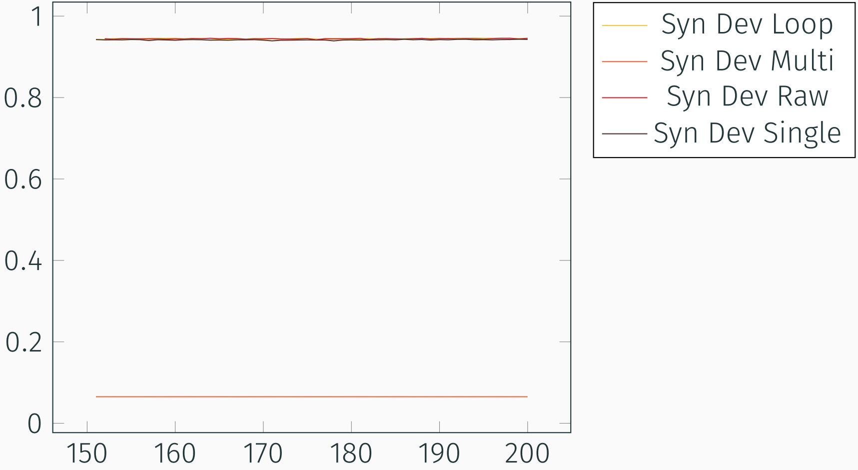


Results | Multitask Learning

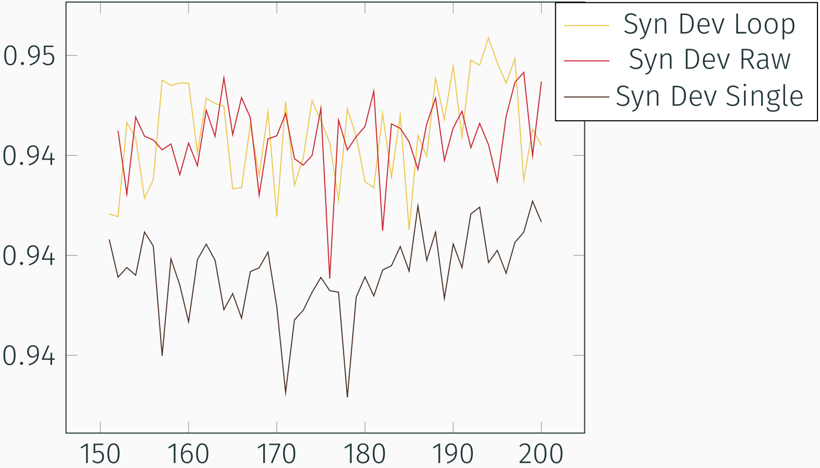


Multitask Learning

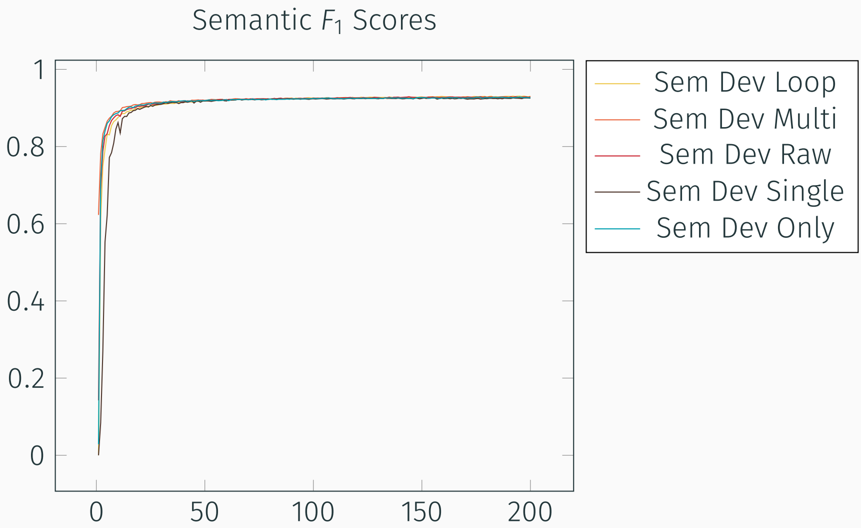
Syntactic F_1 Scores (last 50 epochs)



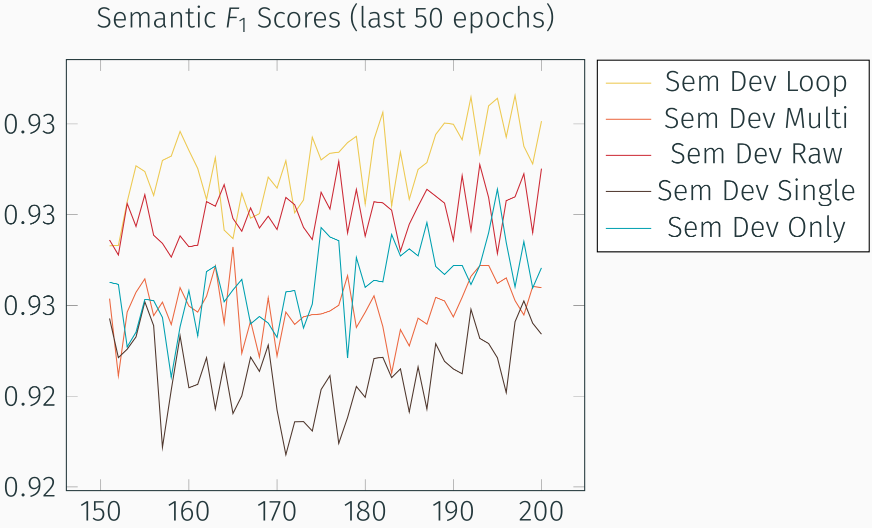
Syntactic F_1 Scores (last 50 epochs without Syn Dev Multi)



Results | Multitask Learning



Results | Multitask Learning



Setting	**Syn Dev**	**Sem Dev**	**Syn Test**	**Sem Test**
Sem Only	0	92.39%	0	**87.50%**
Multitask Raw	-	-	90.92%	**87.80%**
Multitask Single	94.64%	92.6%	90.81%	87.41%
Multitask Multi	-	-	7.39%	87.71%
Multitask Loop	94.29%	92.51%	90.96%	**87.87%**

Table 2: F_1 scores for the different setups.

Outlook

Outlook

- Presumption by [Kurtz et al., 2019] confirmed, at least for this data set
- Bidirectional Encoder Representations from Transformers (BERT)
- Combine BERT and multitask learning

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