

Paper: *A Fast and Accurate Dependency Parser using Neural Networks*

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Quote	<i>“Experimental evaluations show that our parser outperforms other greedy parsers using sparse indicator features in both accuracy and speed. This is achieved by representing all words, POS tags and arc labels as dense vectors, and modeling their interactions through a novel cube activation function.”</i>
Overview	<p>The authors claimed that all the recent dependency parsers use sparse indicator features and also argued that these models generalize poorly. Moreover, the computation of these models are also costly, the authors mentioned. In this paper, the authors proposed a novel approach to address these issues and also developed an activation function that provides better results in terms of accuracy. They have model a neural network which is trained to make parsing decisions that are transition based. Author mentioned that there are 200 learned dense features. The author mentioned that they have employed the arc-standard system by Nivre for the basis of their parser. Moreover, they outlined the problem of Sparsity, Incompleteness and Expensive feature computation.</p> <p>The major accomplishments of this paper are mainly three, that are- the pros of using dense representation, accurate and faster neural network for parsing and a novel activation function named cube activation function. They claimed that this cubed activation function captures the communication of three elements better. Their developed parser is better in accuracy and also faster. They brought improvement of around 2% in terms of accuracy.</p>
Intellectual Merit	<p>This research is mainly an improvement of the dependency parsing models. The parsing is one of the key element of natural language processing and this research has improved this parsing strategy and also developed faster and accurate solution. Application of this model in parsing could bring better understanding of parsing models. This research explored some novel ideas such that the authors developed an activation function which is better than previously used activation functions like tanh and sigmoid. The researchers are from stanford and they have a good command over the topic of parsing. Also, the researcher had several years of experience of doing research in this field of study. They had all the necessary resources to carry this research.</p>
Broader Impact	<p>There are some new knowledge that the reader could know by following this research. The model of the parsing network is faster and accurate. Also, the activation function is novel and does well with it's task. This research is well cited in the natural language study and the authors are also famous in this field. This research was done using the English Penn Treebank and Chinese Penn Treebank datasets. The authors are academics from Stanford and they were supported by the Defense Advanced Research Projects Agency (DARPA) Deep Exploration and Filtering of Text (DEFT) Program under Air Force Research Laboratory (AFRL).</p>

Keywords Natural Language Processing, Dependency parsing, Cube Activation Function, Dense Feature

- Discussion
Questions
- The authors mentioned about the interaction of the elements of dependency parsing but they did not elaborate how the activation function captures the property of dependency parsing. More in depth analysis could reveal valuable information to better understand the properties of dependency parsing.
 - The authors claimed that the accuracy could be improved by using search based models. Also, I wonder how much the activation functions affect the accuracy of the model.

Table 1: Grade deductions by section

Overview	Intellectual M.	B. Impact	Keywords	Questions	Is Online?