ACL 2019

Deep Learning and Formal Languages: Building Bridges

Proceedings of the Workshop

August 2, 2019
Florence, Italy

Introduction

While deep learning and neural networks have revolutionized the field of natural language processing, changed the habits of its practitioners and opened up new research directions, many aspects of the inner workings of deep neural networks remain unknown.

At the same time, we have access to many decades of accumulated knowledge on formal languages, grammar, and transductions, both weighted and unweighted and for strings as well as trees: closure properties, computational complexity of various operations, relationships between various classes of them, and many empirical and theoretical results on their learnability.

The goal of this workshop is to bring researchers together who are interested in how our understanding of formal languages can contribute to the understanding and design of neural network architectures for natural language processing.

All 7 accepted papers and non-archival extended abstracts explore those connections. They do this either by using results from formal languages to improve neural methods or by trying to understand better neural methods through well-studied characteristics from formal languages. Finding such bridges is also the main point of the 6 invited talks.

We would like to thank the authors and specially the programme committee for the timely and insightful reviews. We are looking forward of seeing you in Florence!

The workshop organizers:

Jason Eisner, Matthias Gallé, Jeffrey Heinz, Ariadna Quattoni, Guillaume Rabusseau

Organizers:

    Jason Eisner, Johns Hopkins University
    Matthias Gallé, Naver Labs Europe
    Jeffrey Heinz, Stony Brook University
    Ariadna Quattoni, dMetrics
    Guillaume Rabusseau, Université de Montréal / Mila

Program Committee:

    Raphael Bailly, Université Paris 1
    Borja Balle, Amazon
    Xavier Carreras, dMetrics
    Shay B. Cohen, University of Edinburgh
    Alex Clark, University of London
    Ewan Dunbar, Université Paris Diderot
    Marc Dymetman, Naver Labs Europe
    Kyle Gorman, City University of New York
    Hadrien Glaude, Amazon
    John Hale, University of Georgia
    Mans Hulden, University of Colorado
    Franco Luque, University of Córdoba
    Chihiro Shibata, Tokyo University of Technology
    Adina Williams, FAIR

Invited Speaker:

    Rémi Eyraud, Aix-Marseilles University
    Robert Frank, Yale University
    John Kelleher, Technological University Dublin
    Kevin Knight, Didi
    Ariadna Quattoni, dMetrics
    Noah Smith, University of Washington / Allen Institute for Artificial Intelligence

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Conference Program

Friday, August, 2nd 2019

9:00-9:05	**Opening Remarks**
9:05-9:45	**Invited Talk:** *Do Simpler Automata Learn Better?*
	Kevin Knight
9:45-9:51	**Poster Spotlights:**
	Sequential Neural Networks as Automata
	William Merrill
	Grammatical Sequence Prediction for Real-Time Neural Semantic Parsing
	Chunyang Xiao, Christoph Teichmann and Konstantine Arkoudas
	Siamese recurrent networks can learn first-order logic reasoning and exhibit zero-shot generalization
	Mathijs Mul and Willem Zuidema
9:51-10:30	**Invited Talk:** *A story about weighted automata (WFAs), RNNs and low-rank Hankel Matrices*
	Ariadna Quattoni
10:30-11:00	**Break**
11:00-11:40	**Invited Talk:** *Distilling computational models from Recurrent Neural Networks*
	Remi Eyraud
11:40-11:45	**Poster Spotlights:**
	CYK Parsing over Distributed Representations
	Fabio Massimo Zanzotto, Giordano Cristini and Giorgio Satta
	Relating RNN layers with the spectral WFA ranks in sequence modelling
	Farhana Ferdousi Liza and Marek Grzes
11:45-12:25	**Invited Talk:** *Using formal grammars to test ability of recurrent neural networks to model long-distance dependencies in sequential data*
	John Kelleher
12:25-13:30	**Poster Spotlights:**
	Using SPk Languages to Explore the Characteristics of Long-Distance Dependencies
	Abhijit Mahalunkar and John Kelleher
	LSTM Networks Can Perform Dynamic Counting
	Mirac Suzgun, Yonatan Belinkov, Stuart Shieber and Sebastian Gehrmann
12:30-14:00	**Lunch**
14:00-15:30	**Poster Session**
15:30-16:00	**Break**
16:00-16:40	**Invited Talk:** *Beyond testing and acceptance: On the study of formal and natural languages in neural networks*
	Robert Frank
16:40-17:20	**Invited Talk:** *Rational Recurrences for Empirical Natural Language Processing*
	Noah Smith
17:20-17:30	**Closing Discussion**