

EMNLP-IJCNLP 2019

**Graph-Based Methods for
Natural Language Processing**

Proceedings of the Thirteenth Workshop

November 4, 2019

Hong Kong

©2019 The Association for Computational Linguistics

Order copies of this and other ACL proceedings from:

Association for Computational Linguistics (ACL)
209 N. Eighth Street
Stroudsburg, PA 18360
USA
Tel: +1-570-476-8006
Fax: +1-570-476-0860
acl@aclweb.org

ISBN 978-1-950737-86-4

Introduction

Welcome to TextGraphs, the Workshop on Graph-Based Methods for Natural Language Processing. The thirteenth edition of our workshop is being organized on November 4, 2019, in conjunction with the 2019 Conference on Empirical Methods in Natural Language Processing and 9th International Joint Conference on Natural Language Processing, being held in Hong Kong.

The workshops in the TextGraphs series have published and promoted the synergy between the field of Graph Theory (GT) and Natural Language Processing (NLP) for over a decade. The target audience of our workshop comprises of researchers working on problems related to either Graph Theory or graph-based algorithms applied to Natural Language Processing, Social Media, and the Semantic Web.

TextGraphs addresses a broad spectrum of research areas within NLP. This is because, besides traditional NLP applications like parsing, word sense disambiguation, semantic role labeling, and information extraction, graph-based solutions also target web-scale applications like information propagation in social networks, rumor proliferation, e-reputation, language dynamics learning, and future events prediction.

The selection process was competitive: we received 31 submissions (17 long and 14 short papers) and accepted 18 of them (9 long and 9 short papers) for presentation, resulting in the overall acceptance rate of 58%.

This year, for the first time in the history of TextGraphs, we organized a shared task on Multi-Hop Inference for Explanation Regeneration. The goal of the task was to provide detailed gold explanations for standardized elementary science exam questions by selecting facts from a knowledge base. The shared task received public entries from four participating teams, substantially advancing the state-of-the-art in this challenging problem. The participants' reports along with the shared task overview by its organizers are also presented at the workshop.

We thank Minlie Huang for his invited talk on Controllable Language Generation.

Finally, we are thankful to the members of the program committee for their valuable and high quality reviews. All submissions have benefited from their expert feedback. Their timely contribution was the basis for accepting an excellent list of papers and making the thirteenth edition of TextGraphs a success.

Dmitry Ustalov, Swapna Somasundaran, Peter Jansen, Goran Glavaš,
Martin Riedl, Mihai Surdeanu, and Michalis Vazirgiannis
TextGraphs-13 Organizers
November 2019

Organizers:

Dmitry Ustalov, Yandex, Russia
Swapna Somasundaran, Educational Testing Service, Princeton, USA
Peter Jansen, University of Arizona, USA
Goran Glavaš, University of Mannheim, Germany
Martin Riedl, Heidelberg Druckmaschinen, Germany
Mihai Surdeanu, University of Arizona, USA
Michalis Vazirgiannis, École Polytechnique, France

Program Committee:

Željko Agić, IT University Copenhagen, Denmark
Tomáš Brychcín, University of West Bohemia, Czech Republic
Flavio Massimiliano Cecchini, Università Cattolica del Sacro Cuore, Italy
Tanmoy Chakraborty, Indian Institute of Technology Delhi, India
Mihail Chernskutov, Krasovskii Institute of Mathematics and Mechanics, Russia
Stefano Faralli, University of Rome Unitelma Sapienza, Italy
Michael Flor, Educational Testing Service, USA
Debanjan Ghosh, Massachusetts Institute of Technology, USA
Carlos Gómez-Rodríguez, Universidade da Coruña, Spain
Tomáš Hercig, University of West Bohemia, Czech Republic
Anne Lauscher, University of Mannheim, Germany
Suman Kalyan Maity, Northwestern University, USA
Fragkiskos Malliaros, CentraleSupélec & University of Paris-Saclay, France
Gabor Melli, Sony PlayStation, USA
Mohsen Mesgar, Ubiquitous Knowledge Processing (UKP) Lab, Germany
Clayton Morrison, University of Arizona, USA
Animesh Mukherjee, Indian Institute of Technology Kharagpur, India
Giannis Nikolentzos, École Polytechnique, France
Enrique Noriega-Atala, University of Arizona, USA
Alexander Panchenko, Skolkovo Institute of Science and Technology, Russia
Simone Paolo Ponzetto, University of Mannheim, Germany
Jan Wira Gotama Putra, Tokyo Institute of Technology, Japan
Natalie Schluter, IT University of Copenhagen, Denmark
Rebecca Sharp, University of Arizona, USA
Konstantinos Skianis, École Polytechnique, France
Antoine Tixier, École Polytechnique, France
Nicolas Turenne, Paris Est University & INRA, France
Kateryna Tymoshenko, University of Trento, Italy
Ivan Vulić, University of Cambridge, UK
Vikas Yadav, University of Arizona, USA
Rui Zhang, Yale University, USA

Invited Speakers:

Minlie Huang, Tsinghua University, China

Table of Contents

<i>Transfer in Deep Reinforcement Learning Using Knowledge Graphs</i> Prithviraj Ammanabrolu and Mark Riedl	1
<i>Relation Prediction for Unseen-Entities Using Entity-Word Graphs</i> Yuki Tagawa, Motoki Taniguchi, Yasuhide Miura, Tomoki Taniguchi, Tomoko Ohkuma, Takayuki Yamamoto and Keiichi Nemoto	11
<i>Scalable graph-based method for individual named entity identification</i> Sammy Khalife and Michalis Vazirgiannis	17
<i>Neural Speech Translation using Lattice Transformations and Graph Networks</i> Daniel Beck, Trevor Cohn and Gholamreza Haffari	26
<i>Using Graphs for Word Embedding with Enhanced Semantic Relations</i> Matan Zuckerman and Mark Last	32
<i>Identifying Supporting Facts for Multi-hop Question Answering with Document Graph Networks</i> Mokanarangan Thayaparan, Marco Valentino, Viktor Schlegel and André Freitas	42
<i>Essentia: Mining Domain-specific Paraphrases with Word-Alignment Graphs</i> Danni Ma, Chen Chen, Behzad Golshan and Wang-Chiew Tan	52
<i>Layerwise Relevance Visualization in Convolutional Text Graph Classifiers</i> Robert Schwarzenberg, Marc Hübner, David Harbecke, Christoph Alt and Leonhard Hennig ...	58
<i>TextGraphs 2019 Shared Task on Multi-Hop Inference for Explanation Regeneration</i> Peter Jansen and Dmitry Ustalov	63
<i>ASU at TextGraphs 2019 Shared Task: Explanation ReGeneration using Language Models and Iterative Re-Ranking</i> Pratyay Banerjee	78
<i>Red Dragon AI at TextGraphs 2019 Shared Task: Language Model Assisted Explanation Generation</i> Yew Ken Chia, Sam Witteveen and Martin Andrews	85
<i>Team SVMrank: Leveraging Feature-rich Support Vector Machines for Ranking Explanations to Elementary Science Questions</i> Jennifer D’Souza, Isaiah Onando Mulang’ and Sören Auer	90
<i>Chains-of-Reasoning at TextGraphs 2019 Shared Task: Reasoning over Chains of Facts for Explainable Multi-hop Inference</i> Rajarshi Das, Ameya Godbole, Manzil Zaheer, Shehzaad Dhuliawala and Andrew McCallum .	101
<i>Joint Semantic and Distributional Word Representations with Multi-Graph Embeddings</i> Pierre Daix-Moreux and Matthias Gallé	118
<i>Evaluating Research Novelty Detection: Counterfactual Approaches</i> Reinald Kim Amplayo, Seung-won Hwang and Min Song	124
<i>Do Sentence Interactions Matter? Leveraging Sentence Level Representations for Fake News Classification</i> Vaibhav Vaibhav, Raghuram Mandyam and Eduard Hovy	134

<i>Faceted Hierarchy: A New Graph Type to Organize Scientific Concepts and a Construction Method</i> Qingkai Zeng, Mengxia Yu, Wenhao Yu, JinJun Xiong, Yiyu Shi and Meng Jiang	140
<i>Graph-Based Semi-Supervised Learning for Natural Language Understanding</i> Zimeng Qiu, Eunah Cho, Xiaochun Ma and William Campbell	151
<i>Graph Enhanced Cross-Domain Text-to-SQL Generation</i> Siyu Huo, Tengfei Ma, Jie Chen, Maria Chang, Lingfei Wu and Michael Witbrock	159
<i>Reasoning Over Paths via Knowledge Base Completion</i> Saatviga Sudhahar, Andrea Pierleoni and Ian Roberts	164
<i>Node Embeddings for Graph Merging: Case of Knowledge Graph Construction</i> Ida Szubert and Mark Steedman	172
<i>DBee: A Database for Creating and Managing Knowledge Graphs and Embeddings</i> Viktor Schlegel and André Freitas	177
<i>A Constituency Parsing Tree based Method for Relation Extraction from Abstracts of Scholarly Publications</i> Ming Jiang and Jana Diesner	186

Conference Program

Monday, November 4, 2019

- 9:00–9:15 *Opening remarks*
Organizers
- 9:15–9:35 *Transfer in Deep Reinforcement Learning Using Knowledge Graphs*
Prithviraj Ammanabrolu and Mark Riedl
- 9:35–9:50 *Relation Prediction for Unseen-Entities Using Entity-Word Graphs*
Yuki Tagawa, Motoki Taniguchi, Yasuhide Miura, Tomoki Taniguchi, Tomoko Ohkuma, Takayuki Yamamoto and Keiichi Nemoto
- 9:50–10:10 *Scalable graph-based method for individual named entity identification*
Sammy Khalife and Michalis Vazirgiannis
- 10:10–10:25 *Neural Speech Translation using Lattice Transformations and Graph Networks*
Daniel Beck, Trevor Cohn and Gholamreza Haffari
- 10:25–11:00 *Coffee Break***
- 11:00–11:20 *Using Graphs for Word Embedding with Enhanced Semantic Relations*
Matan Zuckerman and Mark Last
- 11:20–11:40 *Identifying Supporting Facts for Multi-hop Question Answering with Document Graph Networks*
Mokanarangan Thayaparan, Marco Valentino, Viktor Schlegel and André Freitas
- 11:40–11:55 *Essentia: Mining Domain-specific Paraphrases with Word-Alignment Graphs*
Danni Ma, Chen Chen, Behzad Golshan and Wang-Chiew Tan
- 11:55–12:10 *Layerwise Relevance Visualization in Convolutional Text Graph Classifiers*
Robert Schwarzenberg, Marc Hübner, David Harbecke, Christoph Alt and Leonhard Hennig
- 12:10–14:00 *Lunch Break***
- 14:00–15:00 *Invited Talk: Towards more controllable language generation: knowledge and planning*
Minlie Huang

Monday, November 4, 2019 (continued)

15:00–15:30 *TextGraphs 2019 Shared Task on Multi-Hop Inference for Explanation Regeneration*
Peter Jansen and Dmitry Ustalov

15:30–16:00 *Coffee Break*

16:00–17:20 Shared Task Poster Session

ASU at TextGraphs 2019 Shared Task: Explanation ReGeneration using Language Models and Iterative Re-Ranking
Pratyay Banerjee

Red Dragon AI at TextGraphs 2019 Shared Task: Language Model Assisted Explanation Generation
Yew Ken Chia, Sam Witteveen and Martin Andrews

Team SVMrank: Leveraging Feature-rich Support Vector Machines for Ranking Explanations to Elementary Science Questions
Jennifer D’Souza, Isaiah Onando Mulang’ and Sören Auer

Chains-of-Reasoning at TextGraphs 2019 Shared Task: Reasoning over Chains of Facts for Explainable Multi-hop Inference
Rajarshi Das, Ameya Godbole, Manzil Zaheer, Shehzaad Dhuliawala and Andrew McCallum

16:00–17:20 TextGraphs Poster Session

Joint Semantic and Distributional Word Representations with Multi-Graph Embeddings
Pierre Daix-Moreux and Matthias Gallé

Evaluating Research Novelty Detection: Counterfactual Approaches
Reinald Kim Amplayo, Seung-won Hwang and Min Song

Do Sentence Interactions Matter? Leveraging Sentence Level Representations for Fake News Classification
Vaibhav Vaibhav, Raghuram Mandyam and Eduard Hovy

Faceted Hierarchy: A New Graph Type to Organize Scientific Concepts and a Construction Method
Qingkai Zeng, Mengxia Yu, Wenhao Yu, JinJun Xiong, Yiyu Shi and Meng Jiang

Monday, November 4, 2019 (continued)

Graph-Based Semi-Supervised Learning for Natural Language Understanding

Zimeng Qiu, Eunah Cho, Xiaochun Ma and William Campbell

Graph Enhanced Cross-Domain Text-to-SQL Generation

Siyu Huo, Tengfei Ma, Jie Chen, Maria Chang, Lingfei Wu and Michael Witbrock

Reasoning Over Paths via Knowledge Base Completion

Saatviga Sudhahar, Andrea Pierleoni and Ian Roberts

Node Embeddings for Graph Merging: Case of Knowledge Graph Construction

Ida Szubert and Mark Steedman

DBee: A Database for Creating and Managing Knowledge Graphs and Embeddings

Viktor Schlegel and André Freitas

A Constituency Parsing Tree based Method for Relation Extraction from Abstracts of Scholarly Publications

Ming Jiang and Jana Diesner

17:20–17:30 *Closing Remark*

