Natural Logic Meets Machine Learning (NALOMA)

Proceedings of the 1st and 2nd Workshops

June 16, 2021
Preface

This volume consists of papers presented at the first and second workshops entitled NAtural LOgic Meets MAchine Learning (NALOMA). Both workshops were held online; the first with the Web Summer School in Logic, Language, and Information (WeSSLLI) in 2020, and the second with the 14th International Conference on Computational Semantics (IWCS) in 2021.

NALOMA aims to bridge the gap between machine learning/deep learning and symbolic/logic-based approaches to Natural Language Inference (NLI), and it is one of the only workshops organized to do so. The workshop also lays focus on theoretical notions of NLI which influence the way approaches to NLI can and should operate.

We thank everyone who submitted papers to the meeting, including the authors who submitted non-archival extended abstracts. These contributions are not part of the proceedings but can be found within the schedule and on our website (https://typo.uni-konstanz.de/naloma21/) The meetings were enriched by the inspiring talks of our invited speakers: Lauri Karttunen and Ignacio Cases, Ellie Pavlick, and Mark Steedman, in 2020; Vered Shwartz, and Benjamin Van Durme in 2021.

We also thank all and everyone who served on the program committee (most served twice): Lasha Abziniadize, Stergios Chatzikyriakidis, Katrin Erk, Hai Hu, Thomas Icard, Valeria de Paiva, and Hitomi Yanaka. We are also thankful to the Research Unit FOR 2111 “Questions at the Interfaces” of the University of Konstanz, funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation), for its support and for hosting our web pages, and also the Indiana University Program in Pure and Applied Logic. The meeting would not have been possible without the encouragement and organizational support that we received from Sophia Malamud and James Pustejovsky in 2020, and from Rik van Noord and Lasha Abziniadize in 2021.

When people combine research communities, the intent is not merely to talk together but also to find joint intellectual projects. NALOMA’s parents are logic and symbolic AI on one side, and machine learning on the other side. As we welcome NALOMA to its third year, we watch expectantly for those joint projects.

Aikaterini-Lida Kalouli and Lawrence S. Moss
Organizers:
Aikaterini-Lida Kalouli, University of Konstanz
Lawrence S. Moss, Indiana University

Program Committee:
Lasha Abzianidze, Utrecht University
Stergios Chatzikyriakidis, University of Gothenburg
Katrin Erk, University of Texas at Austin
Hai Hu, Indiana University
Thomas Icard, Stanford University
Valeria de Paiva, Topos Institute
Hitomi Yanaka, Riken

Invited Speakers:
2020
Lauri Karttunen and Ignacio Cases, Stanford University
Ellie Pavlick, Brown University
Mark Steedman, University of Edinburgh

2021
Benjamin Van Durme, Johns Hopkins University
Vered Shwartz, Allen Institute for AI (AI2) / University of Washington
Table of Contents

*Learning General Event Schemas with Episodic Logic*
  Lane Lawley, Benjamin Kuehnert and Lenhart Schubert ................................. 1

*Applied Medical Code Mapping with Character-based Deep Learning Models and Word-based Logic*
  John Langton and Krishna Srihasam ................................................................. 7

*Attentive Tree-structured Network for Monotonicity Reasoning*
  Zeming Chen ........................................................................................................ 12

*Transferring Representations of Logical Connectives*
  Aaron Traylor, Ellie Pavlick and Roman Feiman ............................................. 22

*Monotonic Inference for Underspecified Episodic Logic*
  Gene Kim, Mandar Juvekar and Lenhart Schubert .......................................... 26

*Supporting Context Monotonicity Abstractions in Neural NLI Models*
  Julia Rozanova, Deborah Ferreira, Mokanarangan Thayaparan, Marco Valentino and André Freitas 41

*Bayesian Classification and Inference in a Probabilistic Type Theory with Records*
  Staffan Larsson and Robin Cooper ................................................................. 51

*From compositional semantics to Bayesian pragmatics via logical inference*
  Julian Grove, Jean-Philippe Bernardy and Stergios Chatzikyriakidis .................. 60

*A (Mostly) Symbolic System for Monotonic Inference with Unscoped Episodic Logical Forms*
  Gene Kim, Mandar Juvekar, Junis Ekmekciu, Viet Duong and Lenhart Schubert .... 71
Workshop Program NALOMA’20

Sunday, July 12, 2020

4:20–4:30  
*Opening Remarks*
Larry Moss

4:30–5:30  
*Invited Talk: Reasoning with Implicatives: Modular and Compositional Learning for Language Understanding*
Lauri Karttunen and Ignacio Cases

5:40–6:20  
*Research Exchange*

Monday, July 13, 2020

8:45–9:20  
*Learning General Event Schemas with Episodic Logic*
Lane Lawley, Benjamin Kuehnert and Lenhart Schubert

9:20–9:55  
*Applied Medical Code Mapping with Character-based Deep Learning Models and Word-based Logic*
John Langton and Krishna Srihasam

9:55–10:10  
*Coffee Break*

10:10–10:45  
*Learning lexical knowledge with Natural Tableau*
Lasha Abzianidze

Tuesday, July 14, 2020

8:45–9:45  
*Invited Talk: Linguistic Semantics and Contemporary NLI*
Mark Steedman

9:45–10:00  
*Coffee Break*

10:00–10:45  
*Formalizations and Implementations of Monotonicity Reasoning*
Larry Moss
Wednesday, July 15, 2020

8:45–9:20  Investigating the Generalization Ability of Neural Models through Monotonicity Reasoning
Hitomi Yanaka

9:20–9:55  Attentive Tree-structured Network for Monotonicity Reasoning
Zeming Chen

9:55–10:10  Coffee Break

10:10–10:45  Using Monotonicity for Natural Language Inference
Hai Hu

Thursday, July 16, 2020

8:45–9:45  Invited Talk: “I don't know what you mean” semantics is hard: Challenges in evaluation of semantic phenomena
Ellie Pavlick

9:45–10:00  Coffee Break

10:00–10:45  NLI Data and Annotations: a Look Behind the Scenes
Aikaterini-Lida Kalouli

Friday, July 17, 2020

8:45–9:20  Transferring Representations of Logical Connectives
Aaron Traylor, Ellie Pavlick and Roman Feiman

9:20–9:55  Monotonic Inference for Underspecified Episodic Logic
Gene Kim, Mandar Juvekar and Lenhart Schubert

9:55–10:45  Panel discussion and Closing remarks
## Workshop Program NALOMA’21

**Wednesday, June 16, 2021**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
</table>
| 14:30–14:45 | **Welcome and Opening Remarks**  
Aikaterini-Lida Kalouli and Larry Moss |
| 14:45–15:10 | **Do Neural Models Learn Transitivity of Veridical Inference?**  
Hitomi Yanaka, Koji Mineshima and Kentaro Inui |
| 15:10–15:35 | **Does Logic-based Reasoning Work for Dutch?**  
Lasha Abzianidze and Konstantinos Kogkalidis |
| 15:35–16:00 | **Supporting Context Monotonicity Abstractions in Neural NLI Models**  
Julia Rozanova, Deborah Ferreira, Mokanarangan Thayaparan, Marco Valentino and André Freitas |
| 16:00–16:45 | **Invited Talk: Expanding Natural Language Inference**  
Benjamin Van Durme |
| 16:45–17:15 | **(Coffee/Lunch/Dinner) Break** |
| 17:15–17:40 | **Bayesian Classification and Inference in a Probabilistic Type Theory with Records**  
Staffan Larsson and Robin Cooper |
| 17:40–18:05 | **From compositional semantics to Bayesian pragmatics via logical inference**  
Julian Grove, Jean-Philippe Bernardy and Stergios Chatzikyriakidis |
| 18:05–18:30 | **A (Mostly) Symbolic System for Monotonic Inference with Unscoped Episodic Logical Forms**  
Gene Kim, Mandar Juvekar, Junis Ekmekciu, Viet Duong and Lenhart Schubert |
| 18:30–19:15 | **Invited Talk: Natural Language Inference: Challenges and Opportunities**  
Vered Shwartz |
| 19:15–20:00 | **Panel discussion and Closing remarks** |