Key Publications

Julian Hough

December 18, 2017

1. Julian Hough and Matthew Purver. Strongly incremental repair detection. In *Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, pages 78–89, Doha, Qatar, October 2014. Association for Computational Linguistics

   This paper not only showed state-of-the-art results for an incremental disfluency detector, it also provided a new approach to incremental processing for the task and how incremental, rather than utterance-final, performance could be increased without losing utterance-final accuracy. It showed how the best possible output, and a variety of language features could be derived strictly word-by-word as utterances are consumed by the system, and that the processing complexity of the task, and incremental performance of the task could be formalized and evaluated. The incremental metrics are applicable more generally for speech and language processing tasks.

2. Julian Hough and David Schlangen. It's not what you do, it's how you do it: Grounding uncertainty for a simple robot. In *Proceedings of the 2017 ACM/IEEE International Conference on Human-Robot Interaction*, HRI '17, pages 274–282, New York, NY, USA, 2017. ACM

   In this paper we showed how by employing insights from dialogue theory through a live grounding model, which models what is believed to be common ground between the human user and the robot in real time (according to the robot), the robot can communicate to users its current level of uncertainty about the user's intentions in terms of its understanding level and confidence level.

Through a live ratings study, we show how confidence level can only be grounded with users when the robotic actions are parameterized to communicate it (through movement speed and hesitation times), while the internal understanding level is reliably communicated through how often the robot repairs its own actions. This has significance for many industrial and potentially future household robots.

3. Julian Hough and David Schlangen. Joint, incremental disfluency detection and utterance segmentation from speech. In *Proceedings of the 15th Conference of the European Chapter of the Association for Computational Linguistics: Volume 1, Long Papers*, pages 326–336, Valencia, Spain, April 2017. Association for Computational Linguistics

This paper combines the tasks of utterance segmentation and disfluency detection for the first time, and shows how the joint task formulation helps improve the performance of either task on their own. Utterance segmentation in particular, is helped by combining it with disfluency detection, and we showed near state-of-the-art results as a result. It also attempts to compare different deep neural network architectures (a vanilla RNN vs. an LSTM) to see if the common problem of the vanish gradient problem for recurrent neural nets can be overcome- there is an improvement on longer disfluencies with the LSTM. The paper also provides results on speech recognition results.

4. Julian Hough and Matthew Purver. Probabilistic Record Type Lattices for Incremental Reference Processing. In Stergios Chatzikyriakidis and Zhaohui Luo, editors, *Modern Perspectives in Type-Theoretical Semantics*, volume 98 of *Studies in Linguistics and Philosophy*, pages 189–222. Springer International Publishing, Feb 2017

This chapter formalized probabilistic type theory in terms of probabilistic lattices. This was applied to a specific problem in modelling attested psychological results in disfluency processing, but the framework is wide-ranging in scope. It opens the possibility for a general dialogue framework where the most relevant questions can be generated word-by-word, and also permits an interpretable language learning framework to be developed.