
Event Structure Learning

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1 Review of Related Works

Recently, there has been increasing interest in automatically learning event structures from text. Bejan [3] proposed an unsupervised learning approach for discovering event scenarios from texts. They made use of the Latent Dirichlet Allocation probabilistic model that uses the observed events from texts to learn latex scenarios. Compared with the FrameNet [1], they expanded the coverage of the lexical database and increased the flexibility of learning process. However, they failed to extract the relationship between the events in the scenarios.

Chambers and Jurafsky has also proposed a series entity-driven approaches [7, 6, 5]. They made use of coreferring entity mentions to knit events and entities together into an event schema. They first focused on the narrative event chain, which is a partially ordered set of events related by a common protagonist. They also used temporal classifier to partially order the connected events and agglomerative clustering algorithm to generate discrete narrative event chains [7]. Then they moved on to using semantic role labeling to jointly modeling the event arguments with events [6]. It allowed them to model a document’s entire narrative, not just one main actor. However, there are some limitations in this work, including some schemas lack a common topic and distinct roles are incorrectly mixed into a single actor. These limitations were overcome by Balasubramanian et al. [2]. They used co-occurrence statistics of semantically typed relational triples instead of the pairwise representation, to construct a Rel-graph. They also analyzed the graph to rank the tuples and merge arguments to form the actors in the frame. Chambers and Jurafsky also introduced a pipelined approach to use the learned template structure to solve the traditional template-based information extraction problem [5].

In contrast to the previous approaches, which require several ad-hoc metrics and parameters, Chambers [4] adapted the previous entity-driven approach to a single model that requires fewer parameters and far less training data and produced state-of-the-art performance on a traditional extraction task. They were the first to show how coreference chains can be used for schema induction in a probabilistic model. At the same time, Cheung et al. [8] proposed PROFINDER, which was a generative model for schema induction using a sequence model (HMM-based) of verb clauses. Their probabilistic approach made it easy to extend the model with additional linguistic insights and prior knowledge.

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References

- [1] Collin F Baker, Charles J Fillmore, and John B Lowe. “The berkeley framenet project”. In: *Proceedings of the 17th international conference on Computational linguistics-Volume 1*. Association for Computational Linguistics. 1998, pp. 86–90.
- [2] Niranjana Balasubramanian et al. “Generating Coherent Event Schemas at Scale”. In: *Proceedings of the 2013 Conference on Empirical Methods in Natural Language Processing, EMNLP 2013, 18-21 October 2013, Grand Hyatt Seattle, Seattle, Washington, USA, A meeting of SIG-DAT, a Special Interest Group of the ACL*. 2013, pp. 1721–1731.
- [3] Cosmin Adrian Bejan. “Unsupervised Discovery of Event Scenarios from Texts”. In: *Proceedings of the Twenty-First International Florida Artificial Intelligence Research Society Conference, May 15-17, 2008, Coconut Grove, Florida, USA*. 2008, pp. 124–129.
- [4] Nathanael Chambers. “Event Schema Induction with a Probabilistic Entity-Driven Model”. In: *Proceedings of the 2013 Conference on Empirical Methods in Natural Language Processing, EMNLP 2013, 18-21 October 2013, Grand Hyatt Seattle, Seattle, Washington, USA, A meeting of SIGDAT, a Special Interest Group of the ACL*. 2013, pp. 1797–1807.
- [5] Nathanael Chambers and Dan Jurafsky. “Template-based information extraction without the templates”. In: *Proceedings of the 49th Annual Meeting of the Association for Computational Linguistics: Human Language Technologies-Volume 1*. Association for Computational Linguistics. 2011, pp. 976–986.
- [6] Nathanael Chambers and Dan Jurafsky. “Unsupervised Learning of Narrative Schemas and Their Participants”. In: *Proceedings of the Joint Conference of the 47th Annual Meeting of the ACL and the 4th International Joint Conference on Natural Language Processing of the AFNLP: Volume 2 - Volume 2*. ACL ’09. Suntec, Singapore: Association for Computational Linguistics, 2009, pp. 602–610.
- [7] Nathanael Chambers and Daniel Jurafsky. “Unsupervised Learning of Narrative Event Chains”. In: *ACL 2008, Proceedings of the 46th Annual Meeting of the Association for Computational Linguistics, June 15-20, 2008, Columbus, Ohio, USA*. 2008, pp. 789–797.
- [8] Jackie C.K. Cheung, Hoifung Poon, and Lucy Vanderwende. “Probabilistic Frame Induction”. In: *Proceedings of NAACL-HLT 2013*. Association for Computational Linguistics, 2013.