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Natural Language Inference: Is type theory relevant?

Abstract: In this talk I will discuss the issue of Natural Language Inference. Natural Language Inference is roughly the task of inferring a natural language hypothesis H given a set of natural language premises P . I will first start by discussing the complexity of the phenomenon and the way various platforms for NLI have been so far set. Then, I will argue that type theory can be helpful in this task, if we deal with the problem of NLI as theorem proving. Specifically, I will argue that using proof assistants implementing type theories (in this case Coq) within the tradition of Martin L of (sometimes called “modern type theories” in the relevant linguistic literature) are fit to this extent given that: a) they implement modern type theories, which have been shown to be a fit language for natural language semantics (see e.g. Ranta 1994; Luo, 2010, 2011; Chatzikiyiakidis and Luo 2014) and b) they constitute extremely powerful reasoning engines. Given these properties, proof assistants seem to be a good fit to be used as natural language reasoners. I present a brief introduction to the way type theory can be used for natural language semantics and I will present a system that defines a correspondence between GF and Coq functions, in effect providing a resource semantics for the grammatical framework. The system is evaluated against the FraCaS test suite outperforming all previous logical approaches and reaching an accuracy of 83% in total. Issues of proof automation, practicability and scalability will also be discussed. Lastly, I will discuss whether logical approaches have a place in today’s Deep Learning world. The answer I will try to give is that there is still potential use for these approaches as part of hybrid NLI systems or NLI systems operating on controlled domains.