

Natural Logic meets Machine Learning (NALOMA) 2021

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Title: Supporting Context Monotonicity Abstractions in Neural NLI Models

Abstract: Natural language contexts display logical regularities with respect to substitutions of related concepts: these are captured in a functional order-theoretic property called monotonicity. For a certain class of NLI problems where the resulting entailment label depends only on the context monotonicity and the relation between the substituted concepts, we build on previous techniques that aim to improve the performance of NLI models for these problems, as consistent performance across both upward and downward monotone contexts still seems difficult to attain even for state of the art models. To this end, we reframe the problem of context monotonicity classification to make it compatible with transformer-based pre-trained NLI models and add this task to the training pipeline. Furthermore, we introduce a sound and complete simplified monotonicity logic formalism which describes our treatment of contexts as abstract units. Using the notions in our formalism, we adapt targeted challenge sets to investigate whether an intermediate context monotonicity classification task can aid NLI models' performance on examples exhibiting monotonicity reasoning.