Using Pragmatic and Semantic Knowledge to Correct Parsing of Spoken Language Utterances

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Abstract

This paper describes the structure and operation of SOUL, or Semantically-Oriented Understanding of Language. SOUL is a knowledge intensive reasoning system which is opportunistically used to provide a more thorough, fine grained analysis of an input utterance following its processing by a case-frame speech parser. The SOUL postprocessor relies upon extensive semantic and pragmatic knowledge to correct, reject and/or clarify the outputs of the CMU PHOENIX case-frame parser for speech and speech transcripts. We describe briefly both some of the linguistic phenomena which SOUL addresses and how SOUL works to correct inaccurate interpretations produced by the PHOENIX parser. Finally, we present the results six non-overlapping test sets, each evaluated for both speech and speech transcription processing. These test sets evaluate the systems ability to enhance performance in both highly restricted and completely unrestricted input data. Further, some test sets capitalize upon the unique linguistic features of spontaneous speech. These evaluations illustrate that the decrease in incorrect interpretations and total error rate resulting from SOUL's postprocessing are most pronounced in unrestricted transcript data and all forms of speech data, as opposed to carefully constrained test sets. For example, in processing transcription data incorrect interpretations are reduced by 53% in constrained sets, as opposed to 81% in unrestricted sets. In other words, the more difficult the processing and/or interpretation, the more there was to be gained by using extensive reasoning abilities.

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