Augmenting Semantic Parsing with Word Embeddings

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Overview

- Semantic parsing
- Word embeddings
- Augmented semantic parsing
- Experiement

Semantic Parsing

- Maps natural language to formal representation
- e.g., English → SQL, λ-calculus
- Production rules + semantic composition
- Applied to question answering, robot control
- Model can acquire new rules through
  - Question and answer pairs
  - Interactively acquired rules

Word Embeddings

- Represent words as real-valued vectors
- Dimensions are semantically meaningful
- Unsupervised learning
- Uses: synonymy, analogical reasoning
  - “smile” more similar to “happy” than to “sad”
  - “queen” - “woman” + “man” = “king”

Augmenting Sem. Parsing

- SP treats words as meaningless tokens
  - “dog”, “hound”, and “canine” unrelated
- Semantically identical word replacements not always recognized
- NL words have individual semantic content
- Allow SP to treat words as vectors
- Provides robustness against natural variations

Experiment

- Consider a simple grammar: action + object
  - Actions: add, remove, find
  - Objects: box, ball
- Replace in-grammar words with synonyms
  - “destroy ball” → “? ball” → “remove ball”
  - “add cube” → “add ?” → “add box”

Resources

- Semantic parser: SEMPRE (Percy Liang, Stanford)
- Word embeddings: GloVe (Christopher Manning, Stanford)
- Synonyms: WordNet (Princeton)