Identifying and Analyzing Metaphors

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• Many expressions in human language are not literal, but are **metaphorical**, such as: “relationship roadblock”

• Linguistic metaphors are derived from underlying conceptual metaphors
  – Cognitive structures which map a *source* concept to a *target* concept

**LOVE is a JOURNEY**
Research Problems

• Identify which expressions in a document are literal, and which are metaphorical

• Given large amounts of textual data, automatically find the main conceptual metaphors people use
Who Cares?

• Information Retrieval
  – “Relationship roadblock” is not about traffic.
  – Query “vicious people” should find “That guy is a shark.”

• Human-Computer Interaction
  – Understand more of what people say

• Cultural Understanding
  – Find similarities and differences between cultural conceptual metaphors
Basic Ideas

• Three levels of analysis
  – Linguistic metaphors
    *open job*
  – Nominal analogies
    *employment ~ door*
  – Conceptual metaphors
    *WORK is a CONNECTION*
Linguistic Metaphors

- Classification is based on two focal words in the expression, **facet** and **target**
  - Type 1: Subject and complement of an identifying clause “My lawyer$_T$ is a shark$_F$”
  - Type 2: A lexical verb and its direct object “He entered$_F$ politics$_T$”
  - Type 3: An adjective and the noun it describes “open$_F$ government$_T$”
Identify Nominal Analogies

Facets
- open
- closed
- painted
- broken
- locked
- big
- corrupt

Target
government

Source
door

metaphorical associations

 literal associations
Conceptual Metaphors

• In the third and final step, nominal analogies are clustered into conceptual metaphors
• Cluster nominal analogies such that
  – Source and target noun clusters are conceptually coherent AND
  – The implied conceptual metaphor is plausible and supported by corpus statistics
Conceptual metaphors

- Constraints
  - Source cluster must be more concrete than the target cluster
  - The larger the concreteness gap, the better
  - The more concrete the source cluster, the better
  - The more shared facets overall in the nominal analogies, the better
  - The stronger the nominal analogies, the better
  - The more nominal analogies, the better
Linguistic Metaphor Experiments

• Reuters RCV1 corpus, used small number of target terms
• 342,000 texts, used first sentence
• Automatically extracted Type 1,2,3 metaphors using the Stanford Parser
• 4 research assistants annotated data – high inter-rater agreement
Linguistic Metaphor Experiments
Conceptual Metaphor Experiments

- Conceptual metaphors related to government
- 21 naïve subjects, fluent in English
- Given conceptual metaphors and randomly generated foils
Conceptual Metaphor Experiments
Other Projects

- Identify anonymous authors (or their age, gender, personality) based on how they write
- Summarize biomedical research articles to make it easy for physicians to use latest research to treat patients
- Increase efficiency of NLP for scalability
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