
Breakout Group #3 NLP Grand Challenge

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Breakout Group 3—report from the first session

- What project do we propose?
- What science will result?
- What tools will we need?
- What is the Killer App?
- What 10/20 year Vision?

What Project?

- Understanding and modeling purposeful human dialogue in all dimensions.
- Revolutionising speech-, language-, and knowledge- based information extraction in the way that word- and string- based search engines have.
- Engaging different communities: cognitive science, computational linguistics, theoretical and developmental linguistics, speech and other modalities, machine learning

What Science?

- Combining exact rule-based methods for small domains and wide coverage probabilistic robust and scalable methods.
- Based on LARGE hand-built OR automatically-learned syntax/semantics using statistical models.
- Including inference, question negotiation, summarization, response generation, speaker-hearer alignment.
- To be informed by fully instrumented studies of human-human communication including neuroimaging where relevant.
- Facing the problem of embodied/embedded knowledge
- Explicit model-based embodiment vs. implicit data-derived embeddedness.
- Both approaches must be tried. Scalability and practical evaluation are crucial

What Tools?

- Annotation support tools (See report from Infrastructure group)
- One of the key enabling technologies will be data-driven induction of large lexicons, ontologies, and language models from text using unsupervised and semi-supervised methods. (IM words of labeled Wall Street Journal is not enough.)
- Parsing, interpretation and generation
- Low-level inference
- There are many difficult open problems in dialogue and group information dynamics.
- Similarly in multimodality recognition and synthesis.
- Huge challenges to neuroscience to address relevant questions like on-line resolution of ambiguity

What Applications?

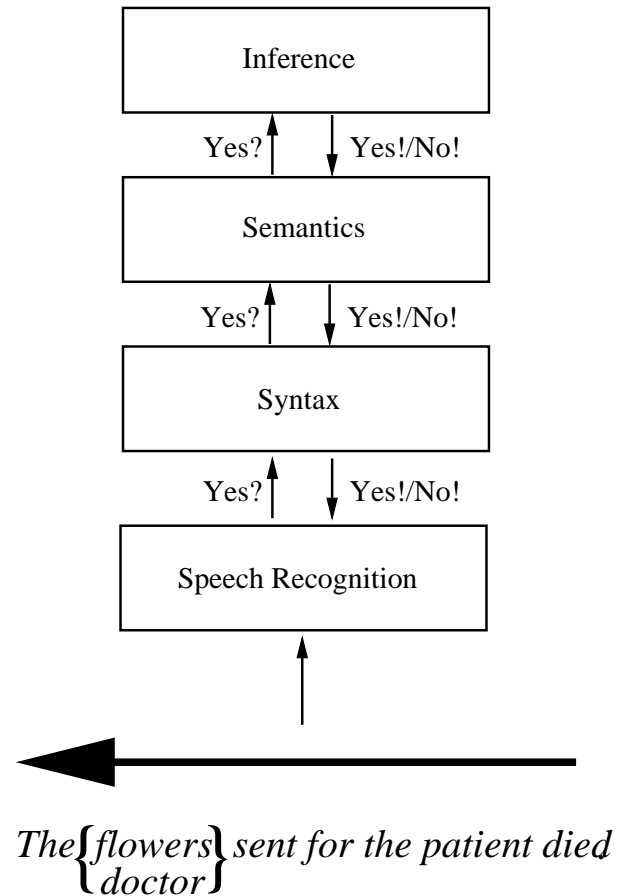
- Multi-level Language Modeling for speech recognition.
- Open domain information-supplying dialogue: the Reference Librarian
- Brian image data domain: information extraction from semi-structured data.
- Museums and media
- Medical Consultation Dialogue

Interdisciplinary Connections

- Infrastructure: Dialogue databases
- Neuroscience: does neuroscience address questions like alignment and ambiguity resolution?
- Linguistics: do linguistic theories support processing models?
- Psycholinguistics: can psychological models of lexical access be applied?

Architecture of the Human Sentence Processor

- “Garden path” effects are sensitive to semantic content (Bever 1970) and context (Crain, 1980), requiring a “cascade” of modules:



The Vision Thing

- Statistical models of word/concept dependency and association are likely to be the only practicable basis for reducing ambiguity and search for semantics, dialogue and inference, as they are for parsing and and sense-disambiguation
- This seems to call for lexicalization at every level of theories and systems.
- One of the key enabling technologies will be data-driven induction of large lexicons, ontologies, and language models from text using unsupervised and semi-supervised methods.
- Answering the homologous question of how we ourselves induce such lexical knowledge from the world that text reflects is crucial to success in this.
- On the ten to twenty year horizon, the outcomes of this research will revolutionise speech-, language-, and knowledge- based information processing, and neuroscientific and psychological understanding of language and the mind.