A Natural Language Understanding System Based on Sequence-Seeking

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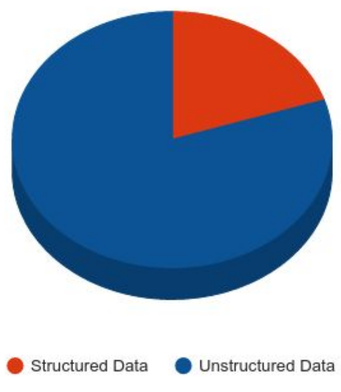
Natural Language Understanding

Most Data is Unstructured

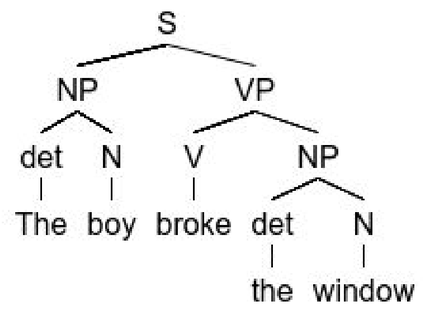


Humans Naturally Interact Through Language

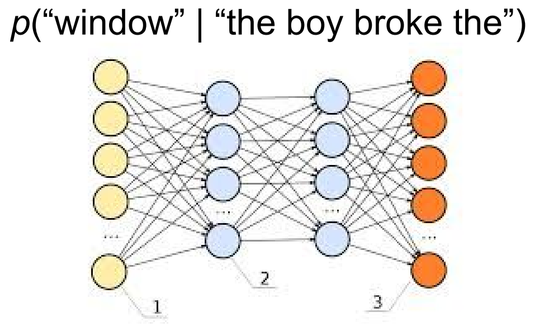
Natural Language Understanding aims to build computer systems that **communicate through language** and **learn from existing language data**

Current Approaches Have Limitations

Computational Linguistics



Statistical Natural Language Processing (NLP)

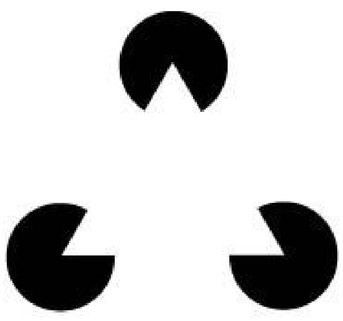


Counterexample: "The boy the ball window broke"

Humans regularly use and understand **ungrammatical** and **ambiguous** language, while most computational systems cannot

Vision: Align Expectations with Perception

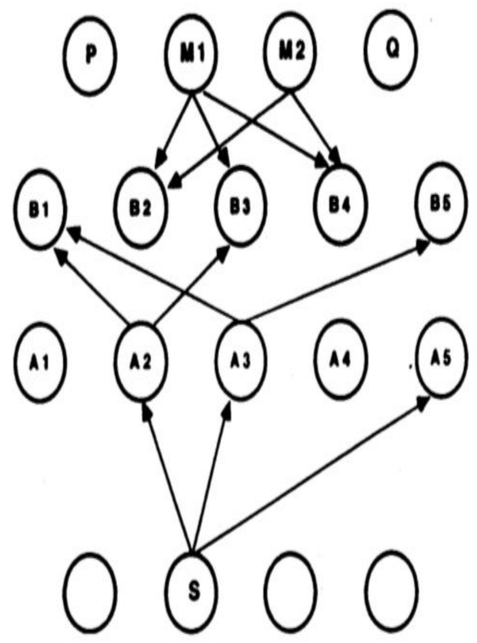
"The whole is *other* than the sum of its parts"

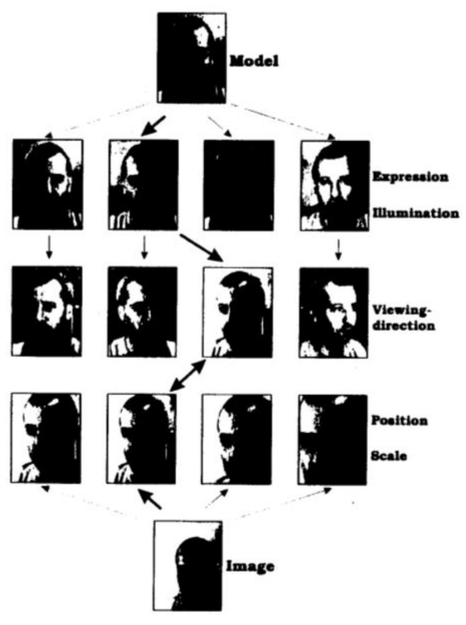


A mental model of a triangle is aligned with the image above so that it is perceived as a triangle rather than circular segments

Research Goal: Demonstrate a Natural Language Understanding system that understands ambiguous language by **aligning models of language with perceived information**

Sequence-Seeking Mimics Perceptual Alignment





The sequence-seeking algorithm finds a **sequence of transformations** from high-level models to perceived information

Sequence-Seeking for Natural Language

Stories provide context

Models learned from stories constrain meaning

Grammar constrains language

"The boy the ball window broke"

Grammar and context provide constraints which are used to find transformations from stories to perceived messages

Anticipated Contributions

Demonstrate a natural language understanding system capable of understanding ambiguous and ungrammatical language

Implement the sequence-seeking algorithm to align models of language with perceived messages

Implement grammar as a bottom-up information stream which constrains language

Implement context as a top-down information stream which constrains possible interpretations

Demonstrate how top-down models can be built from a set of stories