Introduction to Natural Language Understanding

**Goal:** To create *computational models* of language in enough detail that you could write computer programs to perform various tasks involving natural language.

**Ultimate Goal:** To be able to specify models that approach human performance in the linguistic tasks of reading, writing, hearing, and speaking.

*Dual purpose:*

- **Scientific:** to explore the nature of linguistic communication
- **Practical:** to enable effective human-machine communication

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**NLU Draws Heavily from Other Disciplines**

<table>
<thead>
<tr>
<th>Disciplines</th>
<th>Emphasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>linguistics</td>
<td>emphasis on structural regularities</td>
</tr>
<tr>
<td>psycholinguistics</td>
<td>emphasis on the process of language comprehension and production</td>
</tr>
<tr>
<td>philosophy</td>
<td>emphasis on logical accounts of communicative abilities</td>
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<tr>
<td>computational linguists</td>
<td>emphasis on building a computational theory of language comprehension and language generation</td>
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</tbody>
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**Information Retrieval (IR)**

Choose from a set of documents the ones that are relevant to a query.

*Find me all articles on leveraged buyouts.*

*Find me all articles on leveraged buyouts involving more than 100 million dollars that were attempted but failed during 1986 and 1990.*

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**Machine Translation**

Translate from one natural language to another.

*The spirit is willing, but the flesh is weak.*

*The extension of the coverage of the health services to the underserved or not served population of the countries of the region was the central goal of the Ten-Year Plan and probably that of greater scope and transcendence.*

*Welcome to Chinese Restaurant. Please try your Nice chinese Food With chopsticks. the traditional and typical of Chinese glorious history and cultual. PRODUCT OF CHINA*
Information Extraction

Read a text and derive from it some assertions that can be put into a structured database.

BOGOTA, 9 JAN 90 (EFE) – RICARDO ALFONSO CASTELLAR, MAYOR OF ACHI, IN THE NORTHERN DEPARTMENT OF BOLIVAR, WHO WAS KIDNAPPED ON 5 JANUARY, APPARENTLY BY ARMY OF NATIONAL LIBERATION (ELN) GUERRILLAS, WAS FOUND DEAD TODAY, ACCORDING TO AUTHORITIES. CASTELLAR WAS KIDNAPPED ON 5 JANUARY ON THE OUTSKIRTS OF ACHI, ABOUT 850 KM NORTH OF BOGOTA, BY A GROUP OF ARMED MEN, WHO FORCED HIM TO ACCOMPANY THEM TO AN UNDISCLOSED LOCATION.

Summary

Date: 05 JAN 90
Location: COLOMBIA: BOLIVAR (DEPARTMENT): ACHI (TOWN)
Type: KIDNAPPING
Weapon: *
Victim: “RICARDO ALFONSO CASTELLAR” (“MAYOR OF ACHI”)
Perpetrator: “GROUP OF ARMED MEN”
Organization: “ARMY OF NATIONAL LIBERATION (ELN)”

Why is NLP hard?

- massive ambiguity at all levels of analysis
- NLP is AI-complete

Case study: noun phrase coreference