Natural Language Processing
CSCI 4152/6509 — Lecture 2
Course Project

Instructors: Vlado Keselj
Time and date: 16:05 – 17:25, 7-Sep-2023
Location: Rowe 1011

Previous Lecture

- Syllabus and web site review
- Course Introduction

Introduction to NLP

- Definition of NLP
- Some NLP applications
- NLP as a research area
- Short history of NLP
- NLP methodology overview
- Levels of NLP
- Why is NLP hard?
  - ambiguous, vague, universal

Some Computational Reasons that NLP is Hard

1. *highly ambiguous*
   - not easy to program disambiguation
2. *vague* (the principle of minimal effort)
   - not easy to program the context and a priori knowledge
3. *universal* (domain independent)
   - not easy to program general knowledge representation

All of these require reasoning (inference).

Ambiguities at Many Levels of NLP

- Ambiguities of different types happen at all levels of NLP
- We will look at some examples at different levels of NLP

Phonological Ambiguities

- For example, the following words sound the same:
- *two* and *too*, sometimes even *to*
- *would* and *wood*
- *there* and *their*
- *it's* and *its*
- *sea* and *see*
- *I scream* and *ice cream*

Syntactic Level Ambiguity

- Example: *Time flies like an arrow.*
  and consider: *Time flies like an arrow... and fruit flies like a banana.*
- Two meanings represented by two parse trees:

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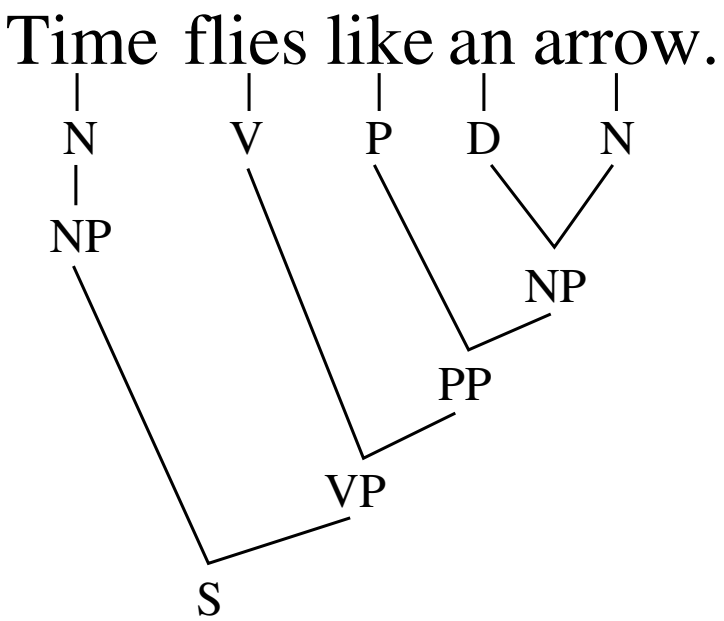

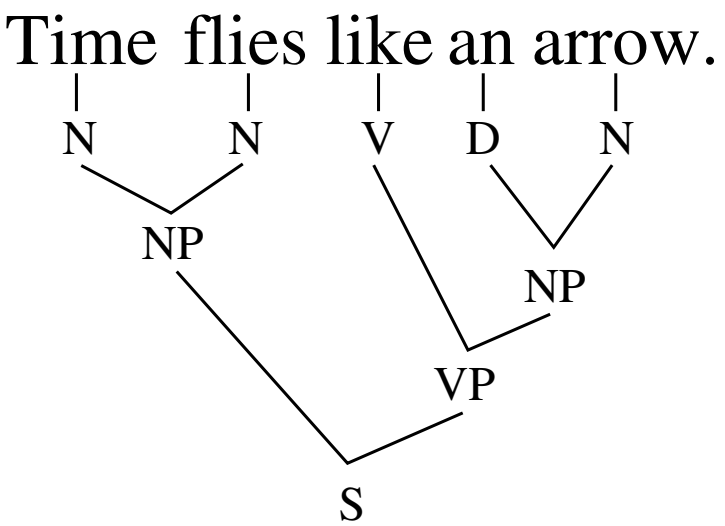

Similar Examples of Syntactic Ambiguity

- Swat flies like ants.
- I saw a man with a telescope.
- I made her duck.
- I bought a computer with a smart card.
- The cow was found by a stream by a farmer.
- Flying planes can be dangerous.
- They are hunting dogs.
- Eye Drops Off Shelf.
- I'm glad I'm a man, and so is Lola.
- Somewhere in the world a woman gives birth every nine minutes.

Semantic Ambiguities

- **semantic lexical ambiguity,** e.g. "hot" may mean: having high temperature, spicy, intense, good looking, or stolen
- Semantic ambiguity examples at the phrase level:
  1. What does "coast road" mean? Is it a road that leads to a coast, or a road that follows the coast?
  2. "carriage return" — Is it a return of a carriage, or an ASCII character?
  3. "kick the bucket", and other idioms
- **referential ambiguity** — a kind of semantic ambiguity, or it can be considered discourse ambiguity
  Example: 'It,' or 'he' in a text – what and who does it refer to?

Pragmatic-level Ambiguity

Examples:

- 12am — is it noon or midnight?
- What date is 10/11/12. Nov 10 or Oct 11 of 2012?

About Course Project

- CSCI 4152:
  - Research or Implementation
  - Individual or Group Presentations
- CSCI 6509 (MCS, PhD, thesis students):
  - Research Project, Individual or Group
  - Individual Presentations
- CSCI 6509 (MACS, MDI non-thesis)
  - Research, Implementation, or Business Oriented
  - Individual or Group Presentations
- Individual projects or teams of up to 4 students
- Preference for a presentation time slot: by email
- Electronic submissions will likely be via GitLab

Course Project

- Deliverables: P0, P1, Presentation, Report
  - P0 — topic proposal,
    - due Fri Sep 29, worth 1%, plain text by email
  - P1 — project statement,
    - due Fri Oct 27, worth 5%, PDF,
  - P — presentation,
    - book a time slot, submit slides, worth: 10%,
  - R — report,
    - due Wed Dec 6, worth: 20%, PDF electronic submission.

Emails and Project Web Page

- Use course number in email subject lines, ideally 'CSCI4152/6509'
- For deliverables, follow the requirements, but the course number is always required in the subject line if delivered by e-mail
- Check the project web page at: `https://web.cs.dal.ca/~vlado/csci6509/project.html`
- The web page contains additional information and will be updated during the term

P0 — Project Topic Proposal

- Worth: 1% of the final mark
- If you choose topic earlier, send it earlier
- If topics overlap too much, later submission may be required to change it
- Plain-text email submission (no attachments) with
  - tentative title
  - list of team members
  - one-paragraph description

P1 — Project Statement

- Worth 5% of the final mark
- Through GitLab (will be clarified later) (text or PDF), about 2 pages
- It must include:
  - Project title,
  - Names of the member(s) of the group,
  - Problem statement,
  - List of possible approaches with citations to relevant work,
  - Project plan for the rest of the term, and
  - List of references.

P — Oral Presentation

- Worth: 10% of the final mark
- Send me preference about time slot by email
- Submit slides at least 24h before presentation
- 8min presentation + 4min for questions (total 12min)
- Use your computer
- Content: related to project, but in a wide sense
- Evaluation:
  - content: interesting, appropriate
  - presentation: vivid, interesting
  - slides: organization, use of text and figures
  - question-answering: to the point

R — Project Report

- Worth: 20% of the final mark
- Submitted electronically
- Typical project report structure:
  - Title, author, course name, date
  - Abstract
  - 1. Introduction, 2. Related work
  - 3. Problem description, Methodology
  - 4. Experiment design, implementation
  - 5. Evaluation
  - 6. Conclusion
  - References, Appendices

How to Choose Project Topic

- Some more information in lecture notes
- A typical approach to a research project
- Alternative project types:
  - theoretical project
  - implementation-oriented
  - software evaluation
  - survey

Resources

- NLP Research Links on the course web page
- `http://acl.ldc.upenn.edu/` — ACL Anthology
- Google scholar and other scientific Internet resources
- Dalhousie library

Example Themes

- These are some themes related to current research at DaI CS
- However, you are encouraged to think about other, different areas
- Themes:
  - Analysis of social media data (e.g., Twitter)
  - Author attribution and profiling
  - Sentiment analysis
  - Processing of email data
  - Language, dialect detection; demographic analysis using NLP, etc.

Topics of Some Previous Course Projects

- The Effects of Sentence Simplification as a Preprocessing Step in Text Summarization
- An Analysis of Predictive Text Software and Algorithms
- Extraction of Topics and Clustering of Documents using Topic Modeling Algorithm
- Role of Emoticons for Sentiment Analysis
- Author Profiling for Keyboard Layouts to Understanding User Typing Pattern
- Natural Language Math Problem Assistance Tool
- Canadian Happiness Level Mapping by Using Twitter Data
- Detection of Emotion and Emotion Stimuli in Text
- *and many more are included in the notes.*