CSCI 544, Lecture 9: Dialogue (cont.); Experiment design; Annotation

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Administrative notes: deadlines

Written Assignment Peer Grading due September 22

- So far, about 40% of the students have completed the grading

Coding Assignment 2 due September 27

Project:

Due Date	Task
September 20	Form project teams (52 teams)
September 20–29	**Initial discussion with TA**
October 4	**Project proposal**
November 3	Project status report
Nov 29/Dec 1	Poster presentations (in class)
December 1	Final report
December 3	Self-evaluation and peer grading

Pick your TA!

Administrative notes: missed class

From the course syllabus:

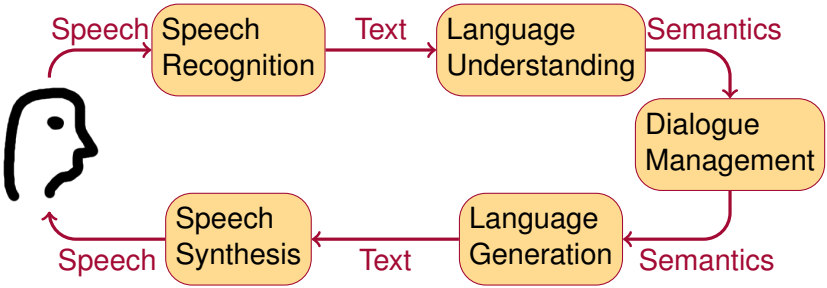
- Students who are absent from class for any reason must make up the materials themselves, and must submit their assignments on time.
- We will make the presentation slides available on Blackboard, and will endeavor to provide lectures both in-person and on Zoom.

☛ Responsibility is **on the student.**

Also on the course syllabus:

- There will be a small number of extra quizzes to allow students to make up for quizzes missed due to late registration, illness, or other reasons. Make-up quizzes will be given after all of the regular quizzes have been taken.

Spoken dialogue systems: prototypical architecture



Information flow, not pipeline

- Input does not necessarily result in output

Types of dialogue systems

Task/goal-based:	Specific, external task
Conversational:	Sustain conversation

Most systems have some of both elements
Conversational goals (even without external goal)

Dialogue state tracking

Dialogue State = where the conversation is now

- A set of state variables
- For task-oriented: which slots have been filled

Dialogue System Technology ~~State Tracking~~ Challenge

Relatively well-defined for simple tasks

Complex tasks might

- share slot values between tasks
- express complex goals in a single utterance
- interleave related tasks

Task lineages: framework

Lee and Stent (2016). Task Lineages: Dialog State Tracking for Flexible Interaction. Sigdial.

Multi-task dialogue (slot-filling)

What is a task? — Book a restaurant, book a ride, . . .

- Each task requires some information in order to be executed

Task schema required and optional slots for operationalization

Dialogue act item slot + value

Task frame parse tasks + associated DAI + confidence + · · ·

Task lineage history of states; maintain in parallel due to ambiguity

Update function extend, then prune (global)

Conversational dialogue systems

Emphasis on maintaining conversation

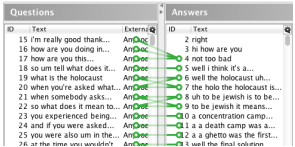
Additional goals: education, entertainment, connection

New Dimensions in Testimony demo

- Conversational question-answering character
- Primarily reactive (responds to user questions)

Retrieval-based system

Train = linked questions and answers



Estimate most likely language model for the response to Q:

$$P(w|Q) \cong \frac{\sum_j \pi_{R_j}(w) \prod_{q \in \mathrm{tok}(Q)} \pi_{S_j}(q)}{\sum_j \prod_{q \in \mathrm{tok}(Q)} \pi_{S_j}(q)}$$

Where: (S_j, R_j) are all linked question-response pairs
π_A is the language model of utterance A

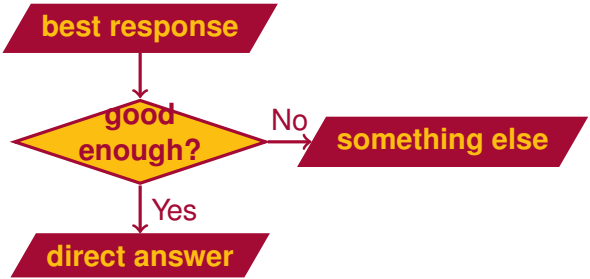
Rank available responses based on distance to estimated LM.

Top-ranked response is the most appropriate.

Non-understanding

Direct response not always available

What's your favorite restaurant?



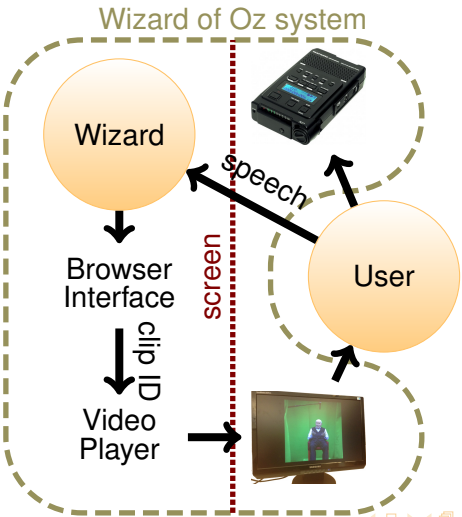
Key to success: good data

Initial system with responses

Collect data in interaction

New responses to fill gaps

More questions for training



Generation

Retrieval has limited expressibility

Generation:

- Template
- Grammar
- Sequence-to-sequence (neural)

Conditioned on what?

Evaluation

Typical evaluation of NLP: compare to “gold standard” reference

- Accuracy
- Precision, recall, F-measure

Evaluation of generation: lexical similarity to reference

- Word Error Rate (speech recognition)
- BLEU, METEOR (translation); ROUGE (summarization)
- Multiple references capture lexical variation

Are lexical similarity measures good for dialogue?

- Much more lexical variation in appropriate utterances