ERROR HANDLING IN DIALOG MANAGEMENT

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OUTLINE

- Error Types
- Error Detection
- Error Handling
- Error Prevention
- Summary
Two main categories:

- Misunderstanding: listener’s interpretation not in line with the speaker’s intentions
- Non-understanding: total interpretation failure / uncertainty of interpretation

Example:

A: I have a red building on my left
B: - How many stories does the blue building have?  
   - What color did you say?
   - Did you say red?

misunderstanding/ non-understanding?

(Skantze, 2007)
Two main categories:
- Misunderstanding
- Non-understanding

Example:
A: I have a red building on my left

B: How many stories does the blue building have?  
   - What color did you say?  
   - Did you say red?

(Skantze, 2007)
Which errors can happen in a dialog when A talks to B?
OVERVIEW

ERROR HANDLING IN DIALOG MANAGEMENT

(Skantze, 2007)
ERROR DETECTION (2)

- Early Error Detection: Before accept/reject hypothesis
- Late Error Detection: After accept/reject hypothesis
- Example:
  
  \[ U: I \text{ can see a brown building.} \]
  \[ S: A \text{ blue building, ok, can you see something else?} \]
  \[ U: No, a brown building. \]

- Online Detection (Meena et al., 2015)

(Skantze, 2007)
Detection Techniques:

- Confidence level:
  - Accept
  - Displaying understanding
  - Clarification request
  - Reject

- Speaker’s uncertainty (Krammer et al., 2001):
  - Prosody: delay, high intonation, filled pause
  - Visual cues: eyebrow movements, smile, low gaze, high gaze, diverted gaze, funny face.

- Dialog history (Meena 2015)
- Grammar
- Spelling
**ERROR HANDLING (1)**

- **Early Error Detected:**
  - Repetition Request
  - Clarification Request

  *U*: I have a red building on my left.
  *S*: Red or blue?

- **Referent Ambiguity (Marge, 2015):**
  - Intrinsic properties
  - History
  - Egocentric Proximity
  - Object Proximity

  **Example:**
  - *Do you mean the table in front of me?*
  - *Should I go to the small or big table?*
Late Error Detected:

- Remove erroneous hypothesis:
  - Late clarification request (Skantze, 2007), e.g.:
    
    A: I am on Blackberry Street.
    
    B: Take to the left.
    
    A: Ok, now I am on Cranberry Street.
    
    B: Weren’t you on Blueberry Street before you turned?
Late Error Detected:

- Restore information state (Larsson 2002)
  
  S: How may I help you?
  
  U: Can you recommend a Turkish restaurant in downtown area?
  
  S: Could you please rephrase that?
  
  U: A Turkish restaurant in downtown.
  
  S: Clowns, which serves Italian food, is a great restaurant in downtown.
  
  U: I am looking for a Turkish restaurant.

- Online Error detection: (Meena et al., 2015)

- Difficult to implement sophisticated model to detect the error
ERROR PREVENTION

- Repetition
- Referent Identification (him, her…)
- Collect more data to improve language model
- Facts to increase confidence score
- Semantics: using (CBOW) continuous bag-of-words encoder (Xie, 2016)
ERROR HANDLING IN DIALOG MANAGEMENT

(Skantze, 2007)

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Thank you for your attention.
Any question?

Literature: