Holocaust museums: live conversations with survivors

This generation will not be around for much longer

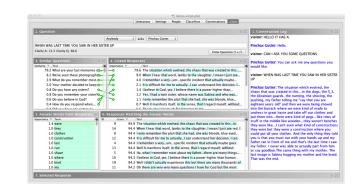
# **New Dimensions:**

- Interactive: Talk and get answers to **your** questions

- Immersive: 3D display, relighting







System Logs

3 locations, 75 participants, 4800 utterances

Collect utterances in conversation

- Rate system response

- Identify best response

**Error-return plots** 

20% off-topics → 16% error

30% off-topics  $\rightarrow$  10% error

Transcribe, annotate

Retrain system

Question-

Answer Pairs

Iterative testing

Automated system

Speech

Test set: Transcriptions

Response

Classifier

Dialogue

Video

Player



Deployed at museum

Wizard-of-Oz System **Develop Automated System** Collect User Assemble Collect User Interactions Process Video Final Development Collect User Questions from Various Sources Process Video Wizard Interface Train Wizards Interactions Initial System Iteratively Improve System 2014

Elicitation Script

# **Common user questions**

- Top 99 questions: museum experts
- New Jersey set: audience note cards



**USC** Institute for

Creative Technologies

Partners: USC Shoah Foundation

Conscience Display

# Off-topic taxonomy

# **Variety of interviewers**

• Stephen Smith (long relation)

Interviewer

Recording

Interview

Survivor

~1400 utterances in 5 days

• Unfamiliar adults

Elicitation Script





# recorded statements?

Wizard system

Wizard

Browser

Interface

Video Player

Overting covers	Top-99		NJ		Wizard	
Question source	N	%	N	%	N	%
Answer available	73	74	366	49	756	58
No answer	18	18	348	47	376	29
Both	1	1	5	1	21	2
Unannotated <sup>a</sup>	7	7	27	4	141	1
Total	99	100	746	100	1294	10
-						

<sup>a</sup>Utterances left unannotated do to a technical error

Interviewer

Recording

Interview

Survivor

~600 additional utterances

95% of user utterances have a direct response

Dec. 10		Jan. 15		Jan. 18	
N	%	N	%	N	%
452	69	427	65	203	58
187	29	214	32	129	37
15	2	21	3	19	5
654	100	662	100	351	100
	N 452 187 15	N % 452 69 187 29 15 2	N         %         N           452         69         427           187         29         214           15         2         21	N         %         N         %           452         69         427         65           187         29         214         32           15         2         21         3	N         %         N         %         N           452         69         427         65         203           187         29         214         32         129           15         2         21         3         19

Source of best response, data from system testing 2014-2015

# NPCEditor: classification-based language understanding

- Direct mapping from user utterances to responses.
- Selects best response from available set.
- Trained on many-to-many mapping:
  - ~1700 Pinchas utterances
  - ~10,000 user utterances
  - ~13,000 links
- Questions and responses need not be in the same language.

# **Cross-language information retrieval**

• Estimate of the most likely language model for the response to *Q*:

$$P(w|Q) \cong \frac{\sum_{j} \phi_{R_{j}}(w) \prod_{q \in \text{tok}(Q)} \pi_{S_{j}}(q)}{\sum_{j} \prod_{q \in \text{tok}(Q)} \pi_{S_{j}}(q)}$$

Where *j* iterates over all linked question-response pairs.

- Rank available responses based on distance to estimated LM.
- Top-ranked response is the most appropriate.

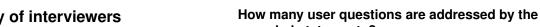
## Dialogue manager: handling misunderstanding

- Direct response not always available: What's your favorite restaurant?
- Is the top-ranked response close enough to the desired answer?

Yes: Return top-ranked response

Return off-topic response

• 5-stage off-topic policy: 1. Please repeat; 2. I don't know; 3. I can't answer; 4. Why don't you ask me about...5. Let me tell you about...



Recorded

# How important is the second recording?

Recorded Video