Intelligent Assistance for Conversational Storytelling Using Story Patterns

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IUI 2011, Palo Alto, CA, USA

Hi, my trip to Spain was …
Lack of connected points
Raconteur: from chat to stories

- IUI’10: single user, preliminary study
- IUI’11: multi-user, chats, user study
- CHI’11: social media aspects

Storyteller: what do viewers want to know?
- Have degrees of control
- Participate in the story creation process

Viewers: how do I connect the story?
- What are they interested to see?
Raconteur demo

Raconteur System

- Narration Processing
  - Textual annotation
- Multimedia data
- Story developer
- Analogical Inference
- Commonsense KB
- Narration Processing
  - User messages
- Edited files
- User Interface
  - messages, edits
- Viewer
- Teller

Suggestions flow between components as indicated by the arrows.
“This installation art by Dali showed up on the way to the museum. It was a big surprise because we didn’t expect to see this in such a local park.”

“Two singers were performing the famous aria “None Shall Sleep” from the opera “Turandot” in this street corner in Barcelona. Again, art can be so close to daily life.”

= media elements = story units

• Unannotated files: kept in the system, but not analyzed
System goal

match chat messages with relevant annotated files

1) Narration Processing

“This installation art by Dali showed up on the way to the museum.”

“This installation art by Dali show up on the way to the museum.”

(“installation”, “art”, “show”, “way”, “museum”)

Stemming and lemmatization, Part of speech (POS) tagging
To identify words including verbs, nouns, adjectives, adverbs, and conjunction markers

Remove interjection:
Yeah, god, gosh, oh, huh, uh, man, well, so, right, yes, .

and non-story-world Clause:
I think, I mean, I said, I guess, I did, you know, you mean, you see, You wouldn’t believe it, that’s all, .

Named entity recognition (NER)
- Story characters: “Peter”, “Gaudi”, “Dali”
- Organizations: schools, museums
- Geographical areas: Spain, Barcelona
- Time: one hour, July 4th

using
Natural Language Toolkit (NLTK)
2) Relevant Files Finding using Commonsense

- common sense knowledge = a set of assumptions and beliefs that are shared among people in our everyday life.
  - “Art is beautiful.”
  - “An airport is used for travel.”
  - “You would smile because you are happy.”

- “… for the everyday necessities of recognizing what a person is “talking about” given that he does not say exactly what he means, or in recognizing such common occurrences and objects.”
  – Sociologist H. Garfinkel 1967

Commonsense Knowledge Tool: OMCS and ConceptNet

- 20 two-place relations
  - AtLocation(art, museum) vs. “Something you find at a museum is art.”
  - PartOf(sculpture, art) vs. “Sculpture is a kind of art.”
  - HasProperty(art, inspiring) vs. “Art is inspiring.”

- > 1 million assertions in English


Commonsense Reasoning Tool: AnalogySpace

- Get an ad-hoc category of a concept
  - “art”, “sculpture”, “painting”, “museum”, and “artist”

- Measure the similarity of different concepts
  - Are “art” and “park” conceptually related?

- Confirm if an assertion is true
  - Are you likely to find art in a park?

1. concept vectors $V_{\text{chat}} = (v_1, v_2, \ldots, v_M)$
2. add up $V'_{\text{chat}} = \sum_{j=f}^{M} v_j$
3. normalize $\frac{\wedge}{\wedge}_{V_{\text{chat}}} = \frac{V_{\text{chat}}}{|V_{\text{chat}}|}$
4. take the dot product $s = \frac{\wedge}{\wedge}_{V_{\text{chat}}} \cdot \frac{\wedge}{\wedge}_{V_n}$

$s > \text{Threshold}$: this file is conceptually relevant to the chat message

3) Consider Story Patterns

- Story structure/grammar/skeleton
  - help connect and comprehend a story
  - might alter listening experience
  - make impressive points

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3) Story Patterns Finding

- **Problem and Resolution**
  - Common pattern in travel stories
    - “leaving for Spain” vs. “flight was delayed/cancelled because of the storm”
    - “buying fresh food in a local market” vs. “wallet got stolen”
    - “putting up the tent” vs. “trouble with assembling the tent poles”
  - To identify problem: Vector $v_{\text{person-desire}}$ from AnalogySpace

<table>
<thead>
<tr>
<th>Problem related concepts</th>
<th>Dot product value</th>
<th>Non-problem related concepts</th>
<th>Dot product value</th>
</tr>
</thead>
<tbody>
<tr>
<td>traffic jam</td>
<td>-0.993</td>
<td>sunshine</td>
<td>0.695</td>
</tr>
<tr>
<td>delay</td>
<td>-0.992</td>
<td>famous</td>
<td>0.687</td>
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<tr>
<td>rain</td>
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<td>earn</td>
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<td>wait</td>
<td>-0.243</td>
<td>relax</td>
<td>0.022</td>
</tr>
<tr>
<td>lose</td>
<td>-0.110</td>
<td>travel</td>
<td>0.018</td>
</tr>
<tr>
<td>steal</td>
<td>-0.032</td>
<td>win</td>
<td>0.017</td>
</tr>
</tbody>
</table>

- Then connect those related events

**User Interactions**

![User Interactions Diagram](image-url)
**User Interactions**

**Teller:** drag & drop items to enhance

or chat on any item

**Viewer:** response with comments or questions

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**Evaluation**

- 10 Participants in 5 pairs
  - All frequent users of social networking sites
  - Storytellers were asked to bring samples of personal media files

- Procedure:
  - Pre-test interview
  - Asked storytellers to select, upload, and annotate files
  - Introduced Raconteur UI to each pair
  - Conducted storytelling session for each pair
  - Post-test interview and questionnaire (Likert-5 scale)
Results of Material and Chats

- 5 collected repositories:
  - Average size: 70.2 media elements
    - 98.0% of photos vs. 2% of video clips (most < 30 seconds)
  - 97.2% of the files were annotated
    - Average length of captions: 10.0 English words
  - 3 of media sets were originally also uploaded to Facebook

- Chats:
  - Average time: 23 minutes
  - 117.6 messages:
    - 52.7% from storytellers (ave. 6.5 words)
    - 47.3% from viewers (ave. 5.6 words)
    - ≠ number of events
      - e.g. “Check this out.”, “You know what?”

Results of Media Used

- **98.2% followed Raconteur’s suggestions**
- 33.1% of files were used
  - no obvious relation between the size of repository and the number of used elements

- Source of edits:
- Styles of interaction:

  “(...) I soon realized I was connecting my experiences together.”
User Feedback

1. Create Stories as Easily as in Daily Conversation
   – “(...) helped me recall and brainstorm my stories. I was not thinking alone!”
2. Make Impressive Points During the Chat
   – Reflected storytellers themselves: “(...) my demo was a hot spot. I've even collected drawings from more than 80 participants.”
   – Viewers were all able to recount the memorable points
3. High Level of Audience Engagement in the Stories
   – helped the audience control of the story content: “I also could see how my friend chose the specific scenes based on my questions.”

• Problems:
  – A created story was less structural for reviewing afterwards
  – It was less easy to retell the friend’s stories in a clear sequence
  – The update speed of system’s suggestion was sometimes too fast

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