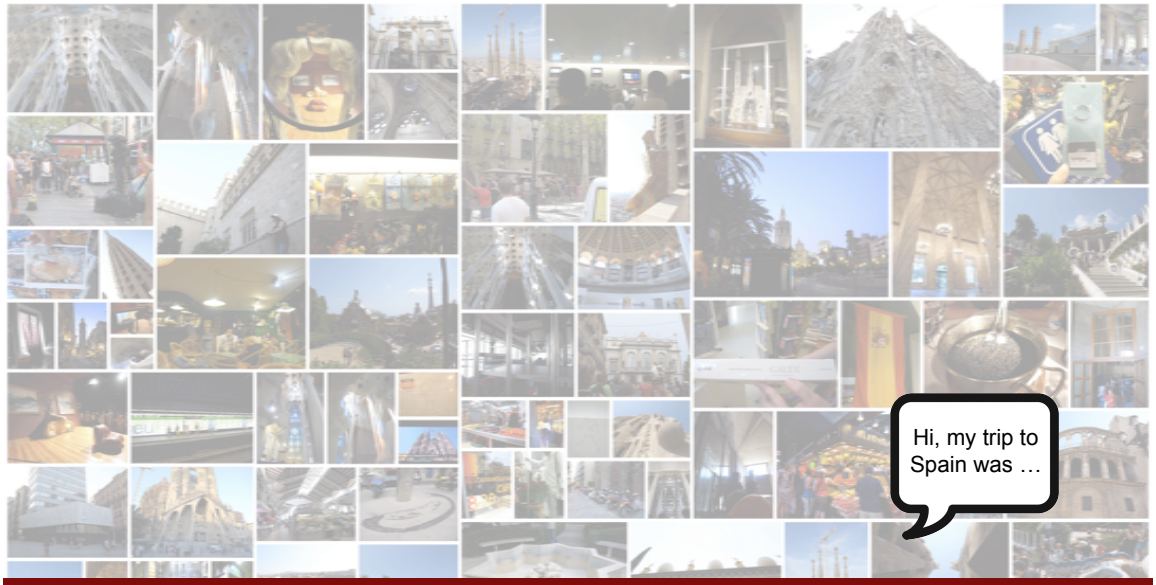
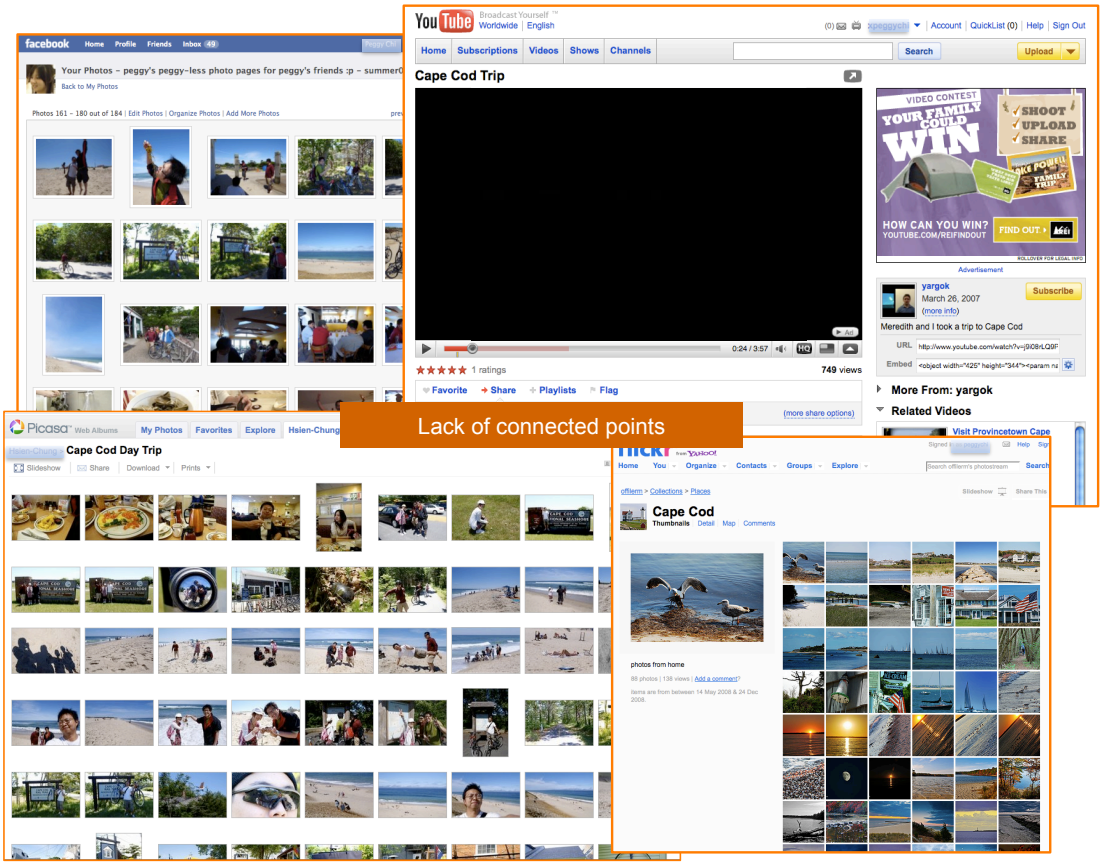


Intelligent Assistance for Conversational Storytelling Using Story Patterns

Pei-Yu (Peggy) Chi and Henry Lieberman
MIT Media Lab

IUI 2011, Palo Alto, CA, USA

Capturing everyday life moments


facebook
Your Photos – peggy's peggy-less photo pages for peggy's friends :p – summer
YouTube
Broadcast Yourself
Worldwide | English
Home | Subscriptions | Videos | Shows | Channels
Search
Upload
Cape Cod Trip
0:24 / 3:57
749 views
Favorite | Share | Playlists | Flag
VIDEO CONTEST
YOUR FAMILY COULD WIN
SHOOT
UPLOAD
SHARE
HOW CAN YOU WIN?
YOUTUBE.COM/REIFINDOUT
FIND OUT
yargok
March 26, 2007
Meredith and I took a trip to Cape Cod
Subscribe
More From: yargok
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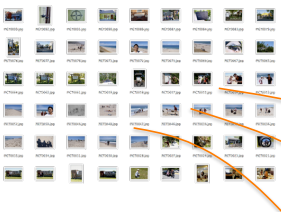
Lack of connected points
Picasa Web Albums
My Photos | Favorites | Explore
Cape Cod Day Trip
Slideshow | Share | Download | Prints
flickr
Cape Cod
Thumbnails | Detail | Map | Comments
photos from home

humans = storytellers

Raconteur : from chat to stories

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



Hey! I went on a biking trip last weekend! Look at what I captured!

Wow! I love those photos on the beach. Where did you go?

It was a one-day trip to Cape Cod with my friends. We biked there (…)

story teller

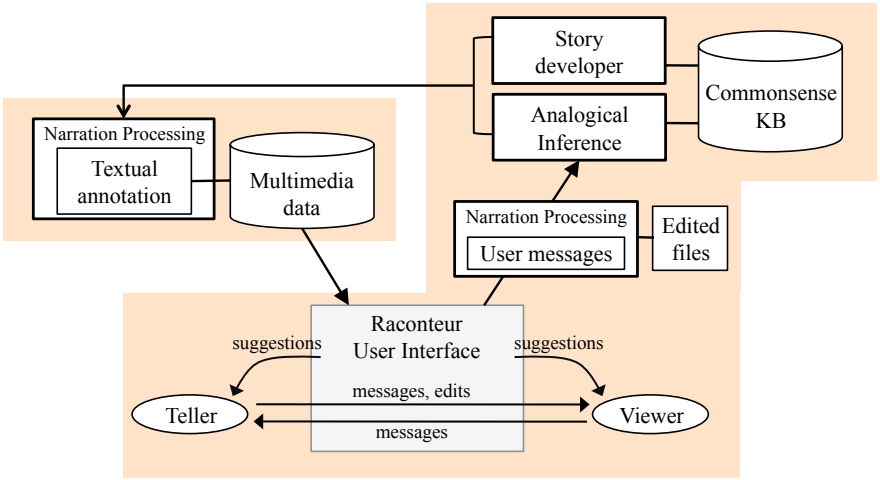
- *What do viewers want to know?*
- *How do I connect the story?*
- *What are they interested to see?*

story viewer

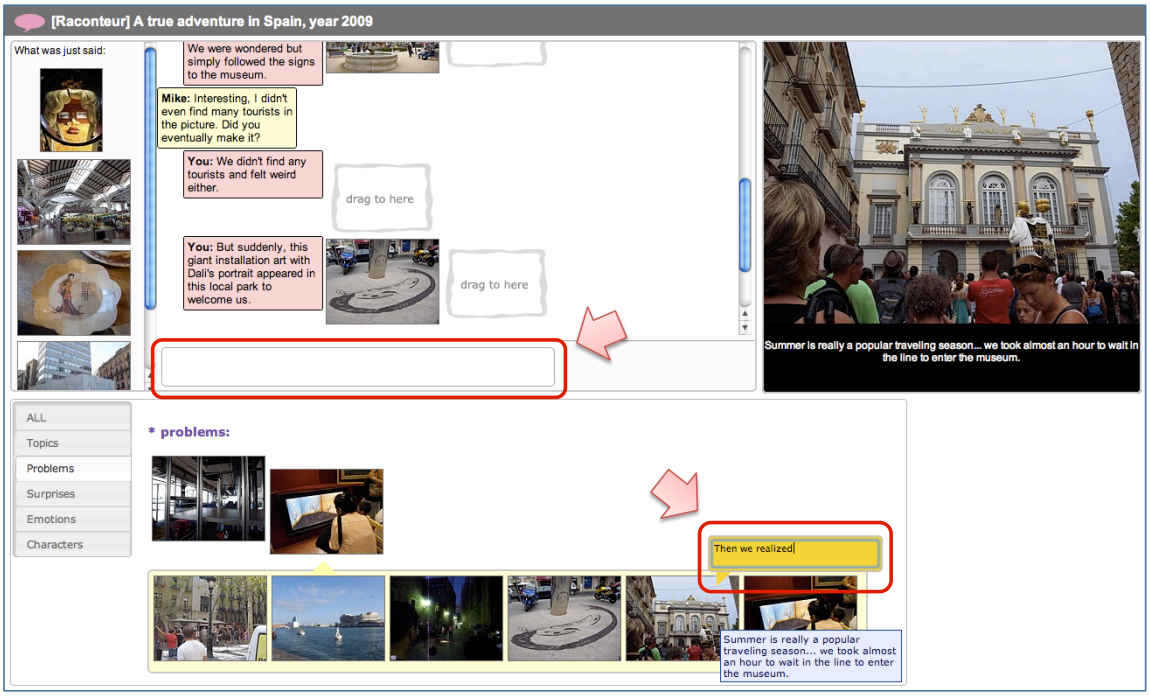
- *Have degrees of control*
- *Participate in the story creation process*

Raconteur demo

Raconteur System



Raconteur Interface



Annotated Multimedia Repository

Given a link to an online album (e.g. Picasa)

photo 

"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."

video (1'00") 

"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."

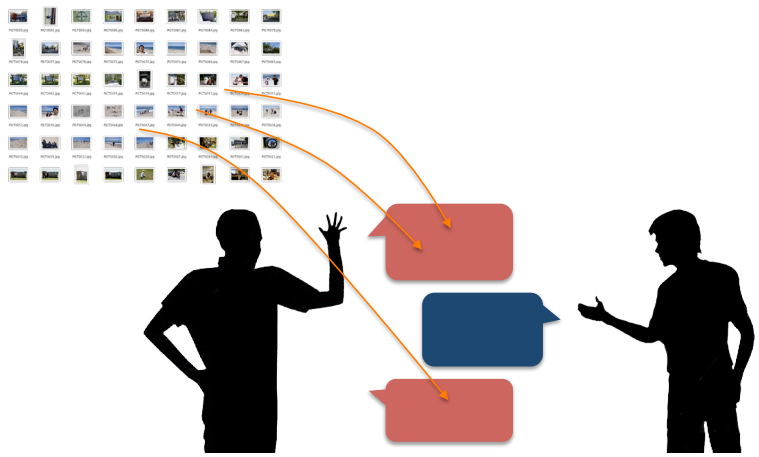
= media elements = story units

- Unannotated files: kept in the system, but not analyzed

http://code.google.com/apis/picasaweb/

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."
N N N V N N

("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)

BIRD, S. KLEIN, E, LOPER, E. AND BALDRIDGE, J. Multidisciplinary Instruction with the Natural Language Toolkit. In *Proc. of TeachCL '08: the 3rd Workshop on Issues in Teaching Computational Linguistics*, 2008.

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."

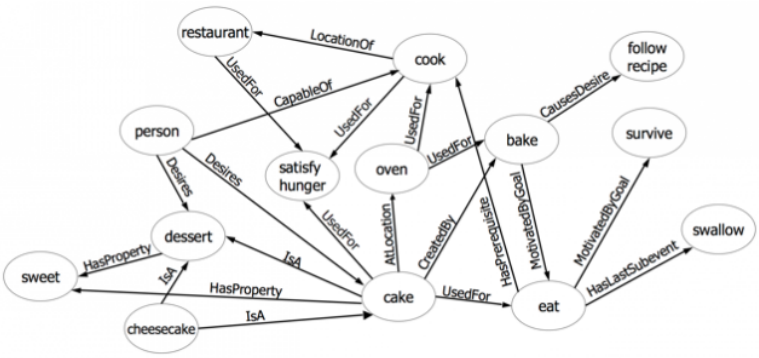
- "… *for the everyday necessities of recognizing what a person is "talking about" given that he does not say exactly what he means, or in recognizing such common occurrences and objects.*"

  – Sociologist H. Garfinkel 1967

GARFINKEL, H. Common Sense Knowledge of Social Structures: The Documentary Method of Interpretation in Lay and Professional Fact Finding. In *Studies in Ethnomethodology*, 1967

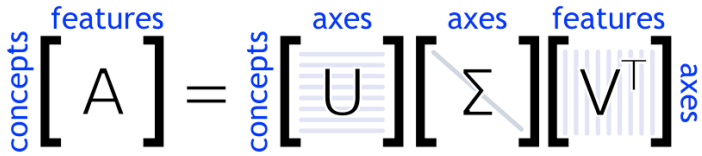
Commonsense Knowledge Tool: **OMCS and ConceptNet**

- 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



LIU, H. AND SINGH, P. ConceptNet: a Practical Commonsense Reasoning Toolkit. In *BT Technology Journal*, vol 22 (4), 2004.

Commonsense Reasoning Tool: **AnalogySpace**



using Singular Value Decomposition (SVD)

- 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?

Speer, R., Havasi, C., and Lieberman, H. AnalogySpace: Reducing the Dimensionality of Common Sense Knowledge. *AAAI2008*.

Associate Computable Media Files

photo/video

"This installation art by Dali showed up on the way to the museum." *caption*

➔ ("installation", "art", "show", "way", "museum") *concepts*

➔ Vectors ($v_{installation}$, v_{art}, v_{show}, v_{way}, v_{museum}) *concept vectors*

i.e. Transform an media file to a list of computable vectors *V*

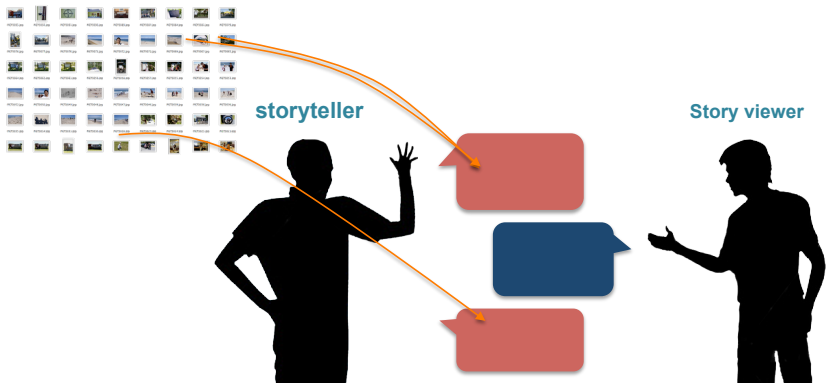
	A chat message with M concepts	A media file n with N concepts
1. *concept vectors*	$V_{chat} = (v_1 , v_2 , \dots , v_M)$	$V_n = (v_1 , v_2 , \dots , v_N)$
2. *add up*	$V'_{chat} = \sum_{i=1}^{M} v_i$	$V'_n = \sum_{j=1}^{N} v_j$
3. *normalize*	$\hat{V}'_{chat} = \frac{V'_{chat}}{\lvert V'_{chat} \rvert}$	$\hat{V}'_n = \frac{V'_n}{\lvert V'_n \rvert}$

4. *take the dot product*

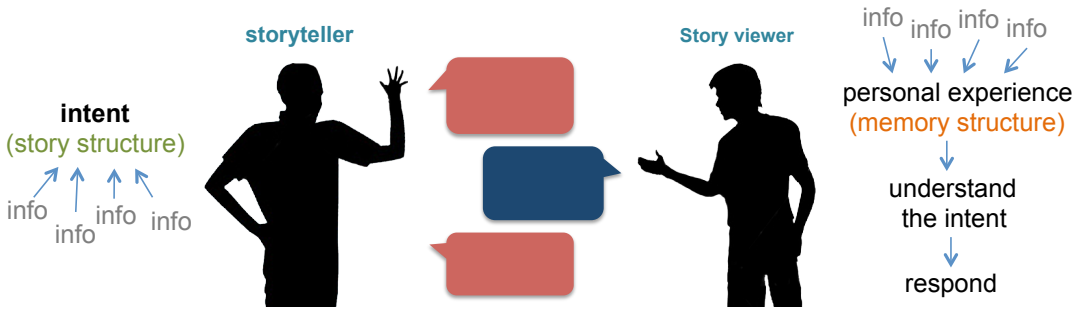
$$s = \hat{V}'_{chat} \cdot \hat{V}'_n$$

$s >$ *Threshold* : this file is **conceptually relevant** to the chat message

Media Files Association



3) Consider Story Patterns



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

SCHANK, R. C. *Tell Me a Story: A New Look at Real and Artificial Intelligence*, Northwestern University Press, 1991.
SCHANK, R. C. *Explanation Patterns: Understanding Mechanically and Creatively*, Psychology Press, 1986.
BLACK, J. B. AND WILENSKY, R. An Evaluation of Story Grammars. In *Cognitive Science*, vol. 3 (3), 1979.

3) Story Patterns Finding

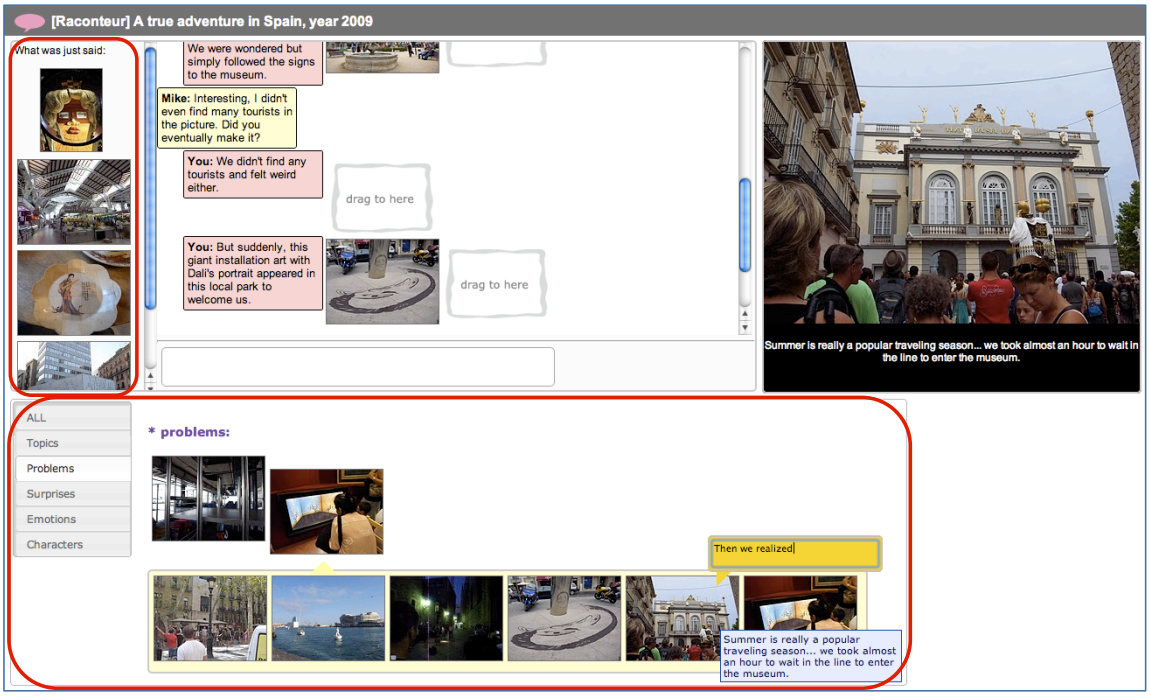
- Problem and Resolution
  - Common pattern in travel stories
    - "*leaving for Spain*" vs. "*flight was delayed/cancelled because of the storm*"
    - "*buying fresh food in a local market*" vs. "*wallet got stolen*"
    - "*putting up the tent*" vs. "*trouble with assembling the tent poles*"
  -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

Problem related concepts	Dot product value	Non-problem related concepts	Dot product value
traffic jam	-0.993	sunshine	0.695
delay	-0.992	famous	0.687
rain	-0.457	earn	0.025
wait	-0.243	relax	0.022
lose	-0.110	travel	0.018
steal	-0.032	win	0.017

  - Then connect those related events

SCHANK, R. C. *Explanation Patterns: Understanding Mechanically and Creatively*, Psychology Press, 1986.

User Interactions

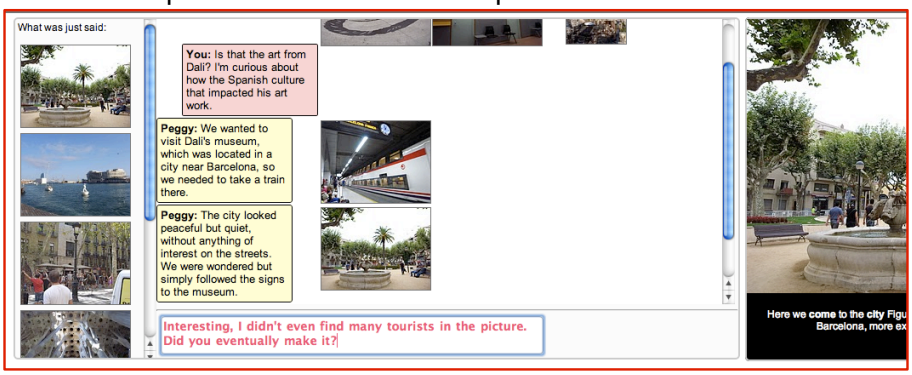


User Interactions

Teller: drag & drop items to enhance

or chat on any item

Viewer: response with comments or questions



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

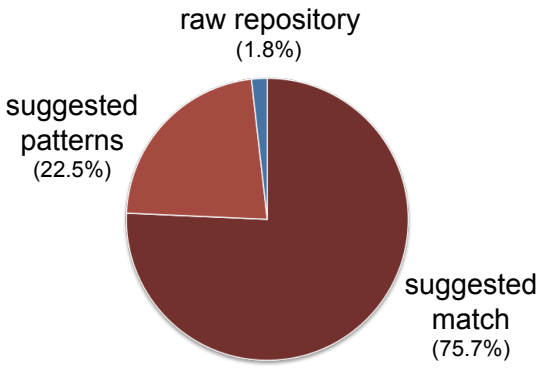
- 5 collected repositories:
  - Average size: 70.2 media elements
    - 98.0% of photos vs. 2% of video clips (most < 30 seconds)
  - 97.2% of the files were annotated
    - Average length of captions: 10.0 English words
  - 3 of media sets were originally also uploaded to Facebook

- 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?*"

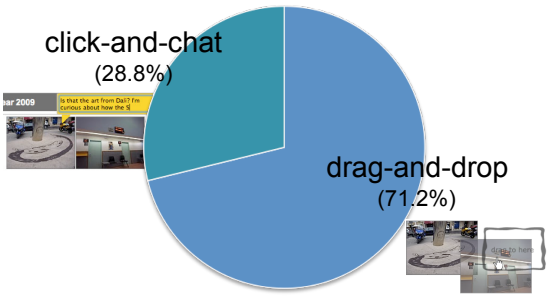
Results of Media Used

- **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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