Three Years of SenseCam Images: Observations on Cued Recall

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Our Original Thoughts...

To effectively provide memory retrieval cues using SENSECAM we need to automatically:

- Group similar images into distinct “events”
- Suggest more “interesting/distinctive” events
- “Associate” related events
- Provide potentially additional retrieval cues from other sources
A Remarkable Collection

• How does SenseCam effect “normal” people? – Most early “gentlemanly” research was carried out on healthy subjects, we try going back to that with SenseCam

• 1 healthy subject -> 2.5 years of SenseCam images (May ’06 – Dec ’08) 2,579,455 images (3,080/day) = 29,301 events (35/day)

• average duration = 14 hours 22 minutes

846 days captured (90.2%), 92 days missing data (9.8%) due to missing sensor files
IT + Memory Researchers = ???

- A complete Lifelog collection
- Memory Expertise
- change in memory perspective
- browser search performance
- Browser importance performance
- Influences on recollective experiences
Change in Perspective

Search effectiveness ... Change in perspective
Important Events

Note: just single ‘keyframe’ image shown to user!!!
Recollective Experiences – Keyframe only

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Recollective Experiences – KF + extra

2 conditions: Surrounding KF only ... Surrounding KF + images in event
Experimental Timeline

- Change in memory perspective
- Browser search performance
- Browser importance performance
- Influences on recollective experiences

50 subject + 50 browser

50 important events

50 random

39 surr KF
40 + images

Find 50 events

Timeline:
- Nov '08
- Jan '09
- Mar '09
- Jun '09
- Jul '09

50 subject + 50 browser

50 important events

50 random

39 surr KF
40 + images

Find 50 events
Perspective Change + Browser Search

• A frustrating experience for the subject – no meaningful “changing of perspective” information gathered

• In 2 hours, only able to find 12/50 target events

• One interesting occurrence of the subject merging 2 separate events (2 weeks apart) into 1 single event

• Predominantly searching based on ‘the when’ axis appears to limit the user
Important Events

• ‘subject memories’ (50x) vs browser events (54x) vs random events (50x)

• Subject’s ratings indicate that novel events are more personally significant (p<.001)
  – Ties in nicely with prior memory research

• Subject memories >> Browser events >> Random events
  – For both novelty and personal significance (all, p<.01)

• Browser important events produce better recollection
  – 28% of browser events were ‘R’ vs. 14% of random events
  – Only 5% of browser events were ‘DK’ vs. 18% of random events
Recollective Experiences –KF Only

Original consistent judgements on ‘keyframe’ image only (79/100):

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>F</th>
<th>DK</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>30</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>F</td>
<td>6</td>
<td>42</td>
<td>0</td>
</tr>
<tr>
<td>DK</td>
<td>6</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

Subject able to report much more information for ‘R’ items than ‘F’ items
Recollective Experiences – KF + Extra

• Working with surrounding keyframes ... 8% of 24 items boosted to ‘R’

• Surrounding KF’s + image detail ... 32% of 25 items boosted to ‘R’

• ‘F’ events that still remained ‘F’ ... surrounding keyframes greatly improve ability to make estimates on the ‘when’

• Subject could provide information on the surrounding events to an ‘F’ event in question
  – Even with the benefit of surrounding keyframes + ability to view event images ... the human mind can’t access memories of event in question
Recap

• **Perspective** - Interesting instance where subject merged two separate events into one in memory

• **Search Performance** - ‘The When’ axis of retrieval can be supported via surrounding events, which helps shift some ‘DK’/‘F’ events to ‘R’

• **Importance Performance** - Browser events > Random

• **Recollective Experiences** - Many mundane events appear to decay from the memory
A more broad reflection

- Some of our early guesses were good:
  - *Storing by events* mimics the human mind
  - *Important browser events* are much better than simple random guesses
  - Displaying all *keyframe event images of each day* supports the user in accessing memories of a given event
Where next?

• Redesign browser to support search of events on multiple axes, rather than just ‘the when’. Then re-run “change of perspective” experiments

• User generated events can provide training data to improve browser choice of important events

• Repeat ‘R’/‘F’/‘DK’ recollective experience experiments all on one sitting on 150 events ... alleviates concerns of looking at similar events for a 2\textsuperscript{nd} time
Support ‘when’ retrieval axis

“Context data in geo-referenced digital photo collections”, Naaman et. al. ‘04
Multidisciplinary Collaboration is Key

The computing science viewpoint:

• We’re good at working with huge amounts of data

• We love thinking of new ways to make the data accessible

• However we need guidance on what data to make available, and on what is useful and important to memory/health/lifestyle researchers
Multidisciplinary Collaboration is Key

• Memory research has driven computing research, which has driven hardware/device research

• New technologies + computing techniques will allow new memory/health/lifestyle research too
  – how well do people estimate the ‘when’ of events?
  – how much time do people spend walking in the park?
  – how do people change their perspective when seeing the cold truth of data? Etc.
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further information:

http://www.clarity-centre.org/sensecamwiki
http://www.cdvp.dcu.ie/SenseCam
http://www.computing.dcu.ie/~adoherty

(case sensitive)