DejaView

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Help with memory, when you need it

SenseCam 2012
Oxford, UK
Outline

• Human memory and electronic aids

• DejaView: system overview

• DejaView: video/demo

• Challenges: latency, energy, and context
Memory tasks

• Distinct subsystems

• Remembering about the past (retrospective)
  – Recalling past experiences (episodic memory)
  – Knowing facts (semantic memory)

• Remembering future plans (prospective memory)
History of memory aids

1994
NeuroPage
Hersh (1994)

1996
PSION trials
Kim (1999)

1998
Forget-me-not
Lamming (1994)

1999
Conference Assistant
Dey (1999)

2000
Hoisko's aid
Hoisko (2000)

2002
iRemember
Vemuri (2004)

2004
SenseCam
Hodges (2006)

Extensions discussed in detail later

2006
Smartphones
Pijnenborg (2007)
Fenwick (2009)
SenseCam for memory problems

- Automatic camera worn around the neck
- Photos reviewed periodically ‘in reminiscence’ using SenseCam viewer
SenseCam for memory problems

Average recollection of details of a number of interesting events, for a person with memory problems

Graph adapted from ‘Mrs. B’ case study (Hodges, et al., 2006)
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Average recollection of details of a number of interesting events, for a person with memory problems

SenseCam for memory problems
SenseCam extensions

- Grouping images by visual similarity (Smeaton, 2006)
- Detecting faces (Smeaton, 2008)
- Using location with GPS (Byrne, 2007)
- Working out activity from movement (Qiu, 2010)
SenseCam architecture

- SenseCam takes a lot of photos
  - ‘Take lots and filter later’
  - ‘more intelligence earlier’
- SenseCam only applicable to supporting retrospective, episodic memory in reminiscence
DejaView: a concept

• A system also capable of supporting memory both in **reminiscence** and **in the moment**

• A flexible system to support a range of memory tasks
  – **retrospective** (past)
    • **episodic** (events)
    • **semantic** (facts)
  – **prospective** (to-do)
DejaView system architecture

- Takes photo when triggered by sensors
- Photo and sensor data
- Adds location (GPS)
- Photo and sensor data
- Recognised faces and contextual information
- 3G
- Internet
- Photos
The DejaView device

- Powerful ARM microprocessor for **image processing** and analysis
- Bluetooth radio
- Microphone detects voices
- 5MP iPhone camera
- USB charger
- Compass and accelerometer
- Light sensor
- PIR sensor
- 4MB memory
The Android phone

- **In the moment** help
- Gateway to Internet
- Adds more sensors and processing power
- Simple GUI for the less tech-savvy
- Already carried by some users

[Image of an Android phone with a photo of a person and text overlay]

- Library photo for confirmation
- Episodic memory prompt
- Name and relationship
The Internet service

- In reminiscence review website for multiple users
- Further training for face recognition
- Interface for learning new people
- Runs face recognition, returns feedback to phone
Latency and energy

- Rule evaluation and camera initialisation: 1.54
- Bluetooth transfer: 7.30
- Moving photo and sensor data to SRAM: 7.94
- Face recognition: 3.05
- Upload to Internet: 0.25

Total latency: 20.1 s
Sensors and rules

- Understand context from combining sensor data
- Dynamic **rules** decide on
  - capturing images
  - enabling/sleeping the device
  - changing device settings
- Taking fewer, better photos
- Saving power

**Contexts**

Similar situations, based on similarity of sensor data (location, light, sound, people around, ...)
Discussion: uses

- Pilot trials with clinicians
- In-the-moment episodic support
- Monitoring of social interaction
- (Multi-person) lifelogging in real-time
Summary

- We have developed a **new memory aid** system which gives support both **in the moment** and **in reminiscence**
- Gives assistance to the user via their mobile phone
- Saves the captured photos to a website for review, shown to be of benefit in the existing literature
DejaView

Questions?