Useful Tools for Open Data Sharing are also Useful Tools for Research

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Rensselaer | Cognitive Science

Cog Works

Experience with MacSHAPA

- Submariners

Challenges for Open Data Sharing

- Tools to control the flow of data from the lab, to the journal paper, and beyond
- Tools that will aggregate sampled data to form meaningful units at different levels of analysis; e.g., sampled eye data (240 hz) into eye fixations (≈ 10 to 5 hz) that can be combined with motor data (e.g., mouse clicks) and external events to form interactive routines (≈ 3 to 0.3 hz)
- High bandwidth data collection with well formatted records, easy to reuse documentation, and ability to address new questions after the data is collected
- Automated or semi-automated protocol analyses, which enable theory-based parsing of log files to form runnable cognitive models
- Visualizing and exploring data in terms of sequence, co-occurrence, and other patterns

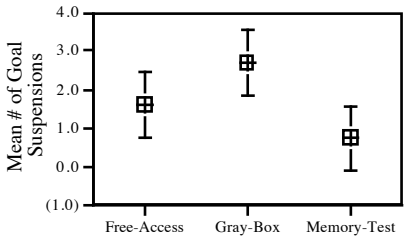
Examples

- Submariners – MacSHAPA example
- SANLab-CM – *Stochastic Analytic Network Laboratory for Cognitive Modeling*
  - CogTool → SANLab
- ACT-PRO – Action Protocol Analyzer
- EEG
- Measuring workload

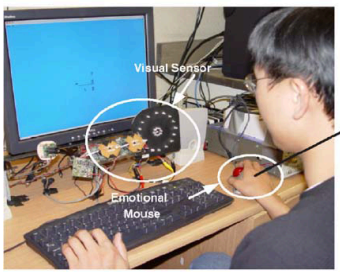
CogTool to SANLab

Demonstration of predicting the distribution of time taken by a skilled pilot to perform a routine task in the cockpit using CogTool and SANLab-CM

Bonnie E. John
Carnegie Mellon University
30 August 2011


Mean # of Goal Suspensions
4.0
3.0
2.0
1.0
0.0
(1.0)
Free-Access
Gray-Box
Memory-Test

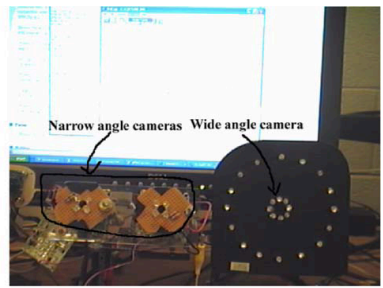
Component	Variables	States	Description
context	context	complex/simple	The surrounding environment of the subject
profile	health age skill …	good/normal/bad old /young strong/weak …	Personal information of the subject
goal	goal	important/not important	The importance of successfully finishing the tasks to the subject
workload	workload	high/normal/low	
affective states	stress fatigue nervous …	positive/negative positive/negative positive/negative …	
physical	physical	high/normal/low	Physical state of the subject
physiological	physiological	high/normal/low	Physiological state of the subject
behavior	behavioral	normal/abnormal	
performance	performance	good/normal/bad	
eyelid movement	BF AECS	high/normal/low fast/normal/slow	Blinking frequency Average eye closure speed
pupil	PerSac GazeDis PerLPD PRV	large/normal/small normal/abnormal large/normal/small large/normal/small	Percentage of saccadic eye movement Gaze spatial distribution Percentage of large pupil dilation Pupil ratio variation
facial expression	facial expression	neutral, happiness, sadness, anger, surprise, disgust, fear	
head movement	head movement	normal/abnormal	
ECG	ECG	normal/abnormal	Electrical pulse of the heart
mouse pressure	mouse pressure	high/normal/low	
response	response	fast/normal/slow	
accuracy	accuracy	good/normal/bad	
assistance	assistance	null/warning/alleviating /intervening	
sensor	S	on/off	on: evidence is collected off: no evidence is collected


Visual Sensor
Emotional Mouse

(a)


Pressure Sensor
Photo Sensor
Temperature Sensor
GSR Sensor

(b)


Narrow angle cameras
Wide angle camera

(c)


Thank You!