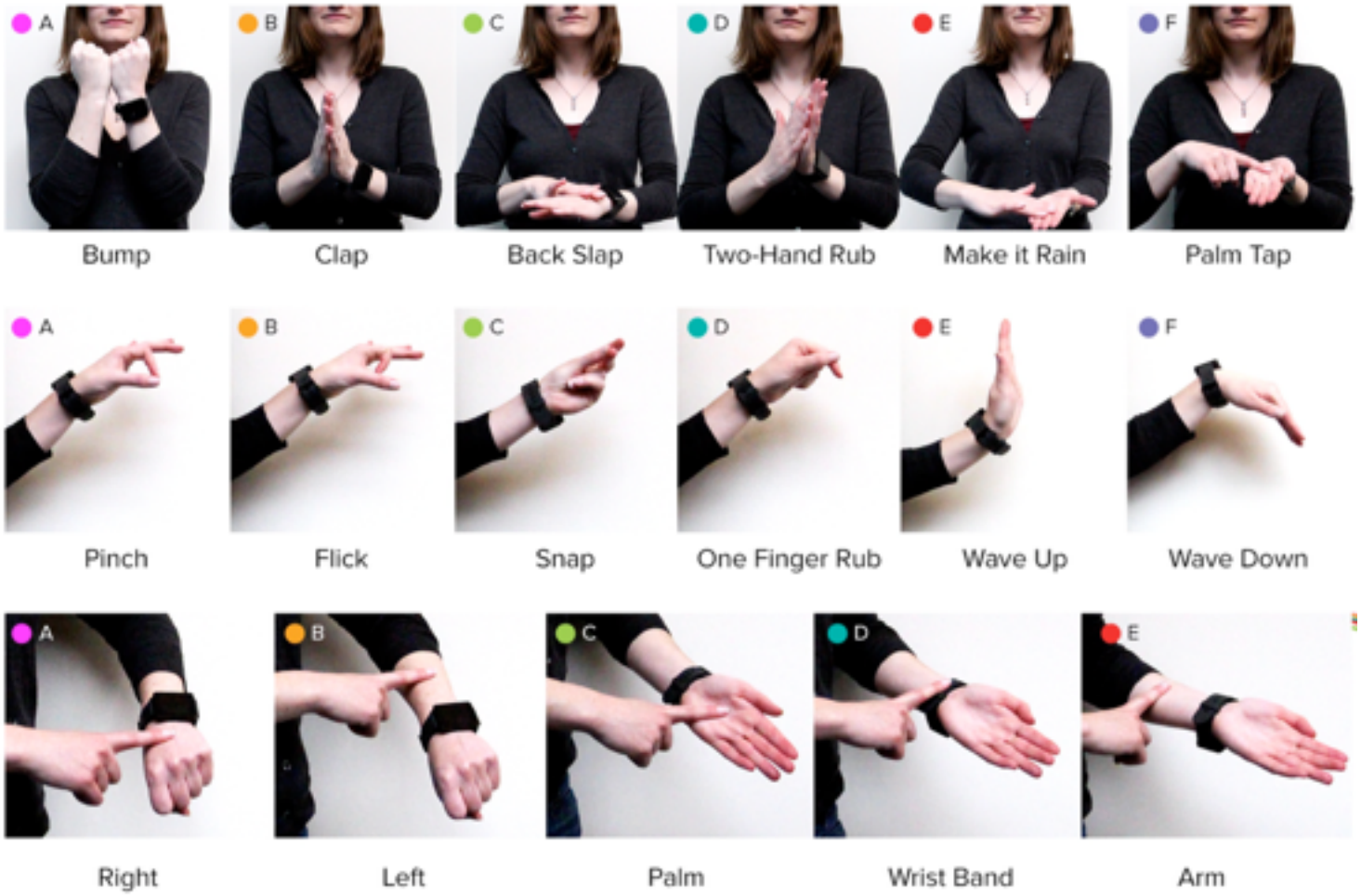


Applications: HCI

EE382V Activity Sensing and Recognition

UT Austin • Dept. Electrical and Computer Engineering • Fall 2016

Today

Audio Sensing Homework Quotes (10 mins)

Recognizing Water-Based Activities with IMS (15 mins)

Activity Recognition + HCI (20 mins)

Papers + Panel of Experts (30 mins)

Homework #5 Quotes

“let us suppose one day that insurance companies use audio to determine the insured person’s context. Could insurance scammers one day submit false tags to train these algorithms to falsely recognize a specific context? Maybe smokers can submit flawed data into the database to make something like a “smoke break” context hard to recognize.”

Training models from web-collected data

Homework #5 Quotes

“In the real-time testing they mention about collecting data using mobile phones and use them as ground truth for capturing images like SenseCam. I feel the ground truth is not convincing as it can not detect all the activity of the user. Suppose if a person is on a call, he/she will be speaking but the camera cannot capture that, as he/she will be wearing the phone around neck.”

Bodyscope

Homework #5 Quotes

“I don’t think this study is very well-motivated, because this sensor is not suitable to commercialize. It may seem weird for people to wear such a head phone around their necks in everyday life, and wearing this sensor may even feel uncomfortable.”

Bodyscope

Homework #5 Quotes

“However, the microphone is still considered a high energy sensor relative to other low energy inertial sensors. To overcome the energy constraints, opportunistic sensing and adaptive sampling can be used while observing user context surrounding changes.”

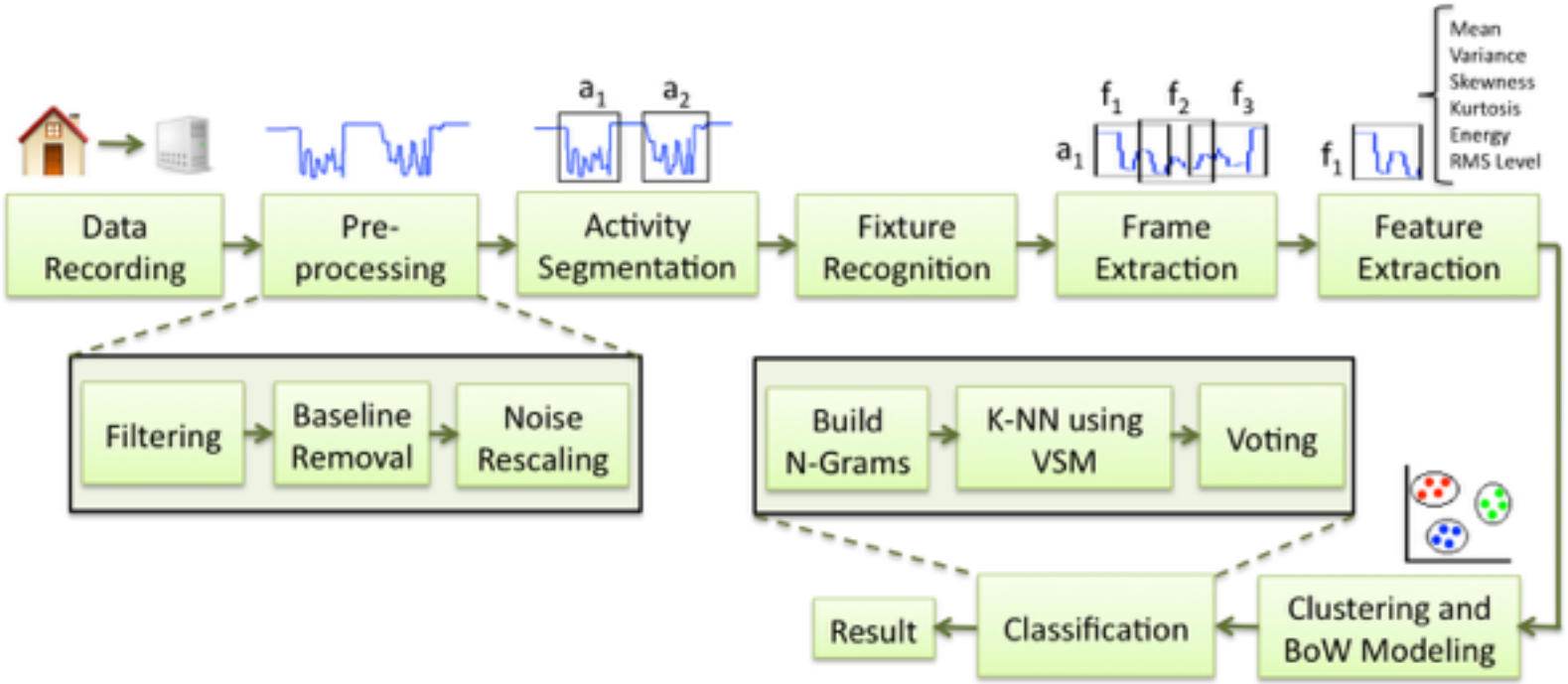
SoundSense

Recognizing Water-Based Activities with IMS

IMS :: Hydrosense

IMS :: Hydrosense

Activity Recognition



User Study

Aware Home
2 weeks
28 participants
8 senior adults

Reflect a real-world scenario as much as possible, within a controlled environment

User Study :: Activities

Location	Activity
Bathroom	Shave
Bathroom	Brush Teeth
Bathroom	Wash Hands
Bathroom	Flush Toilet
Kitchen	Wash Hands
Kitchen	Fill Up Teakettle
Kitchen	Make a Salad
Kitchen	Rinse a Fruit
Kitchen	Take Glass of Water
Kitchen	Do Dishes

User Study :: Protocol

Participants followed a script

Sequential script read out loud by researcher

Beginning and end of activities were tagged

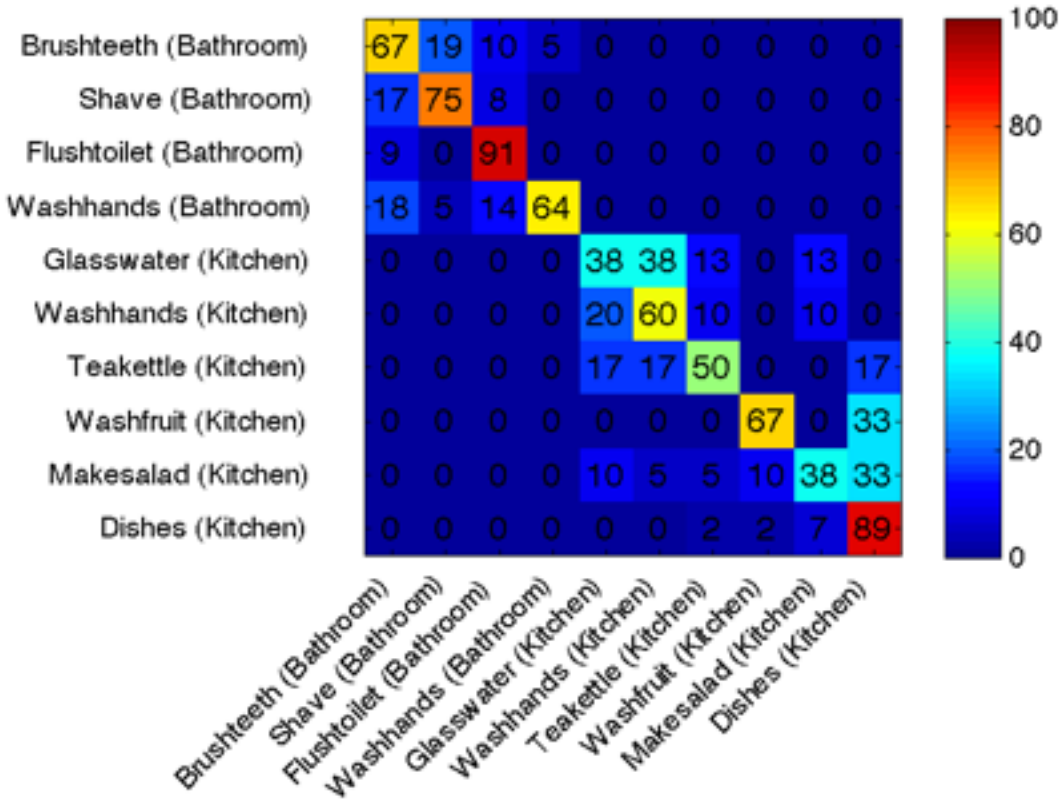
Web-based labeling tool (mobile)

Staged realistic environment for participants

Set up dirty dishes, pots and pans

User Study :: Realistic Setting

User Study :: Results



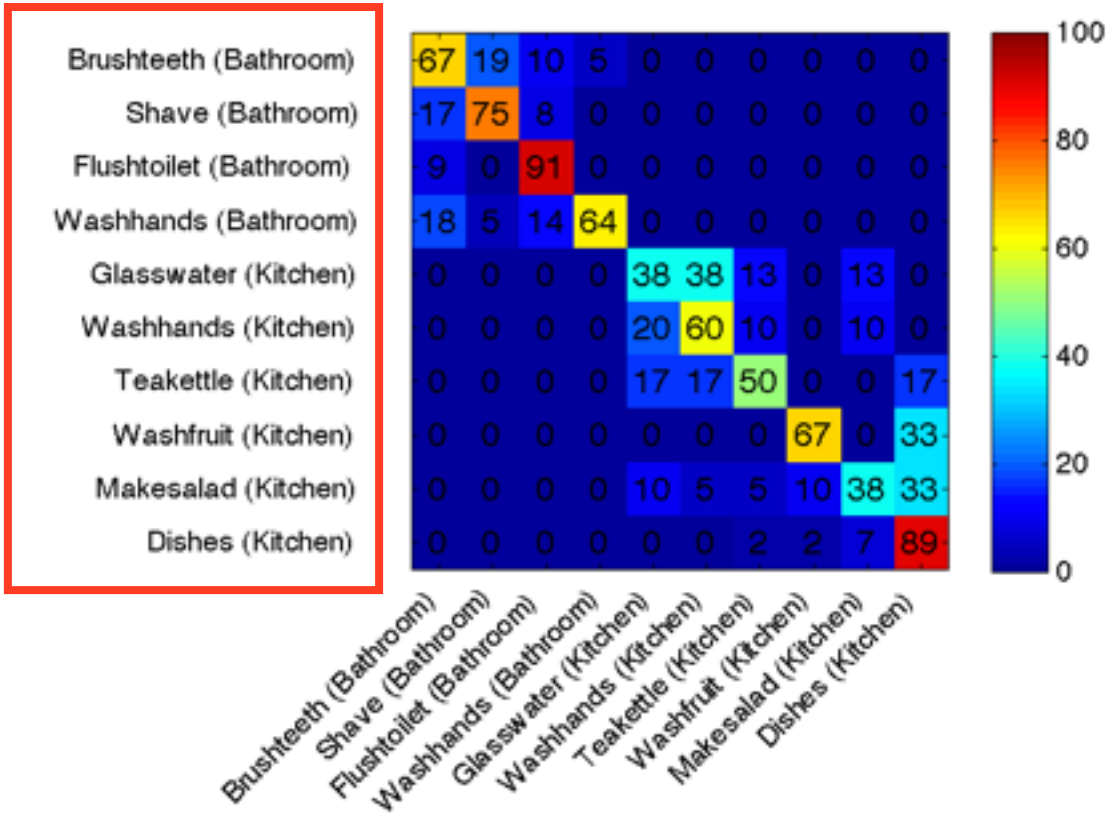
70.11%

Overall Accuracy

(253 Samples, 1 Example)

(LOOCV)

User Study :: Results



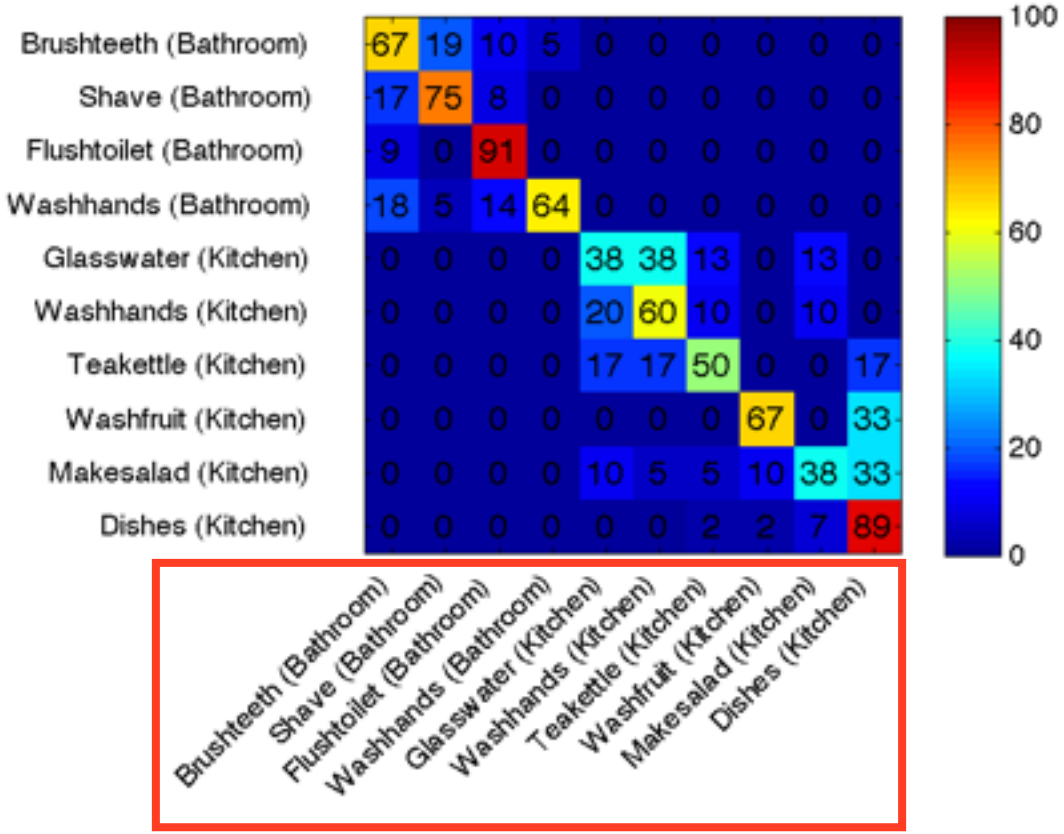
70.11%

Overall Accuracy

(253 Samples, 1 Example)

(LOOCV)

User Study :: Results



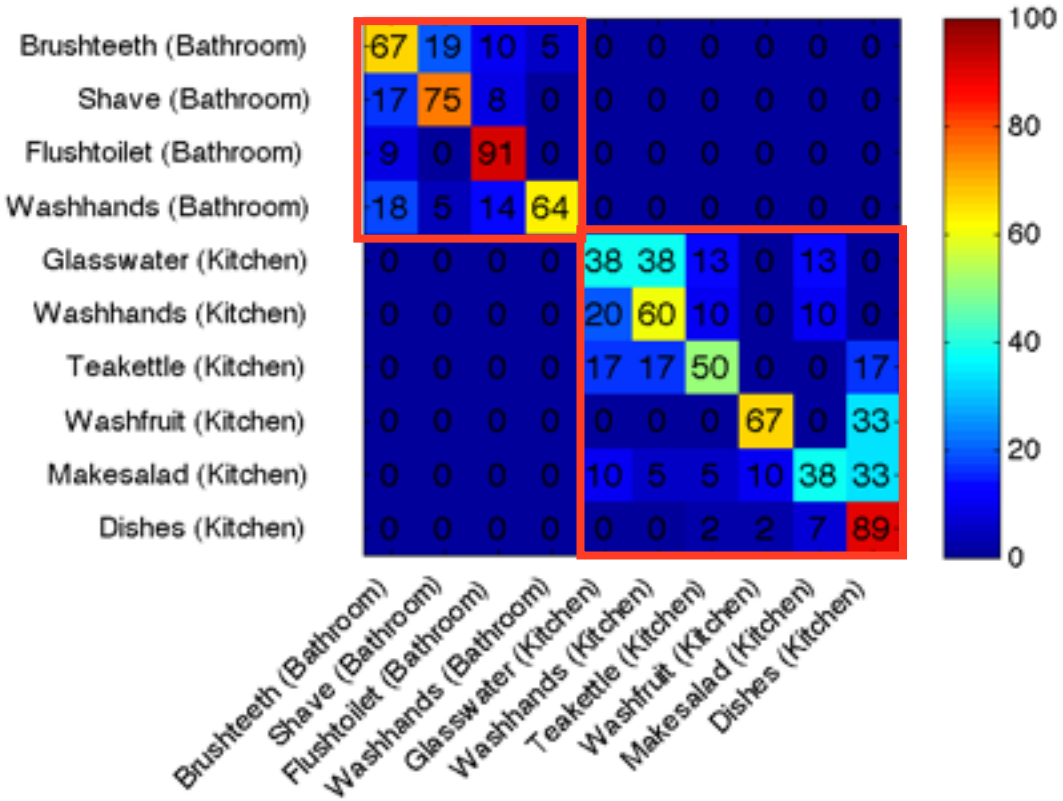
70.11%

Overall Accuracy

(253 Samples, 1 Example)

(LOOCV)

User Study :: Results



70.11%

Overall Accuracy

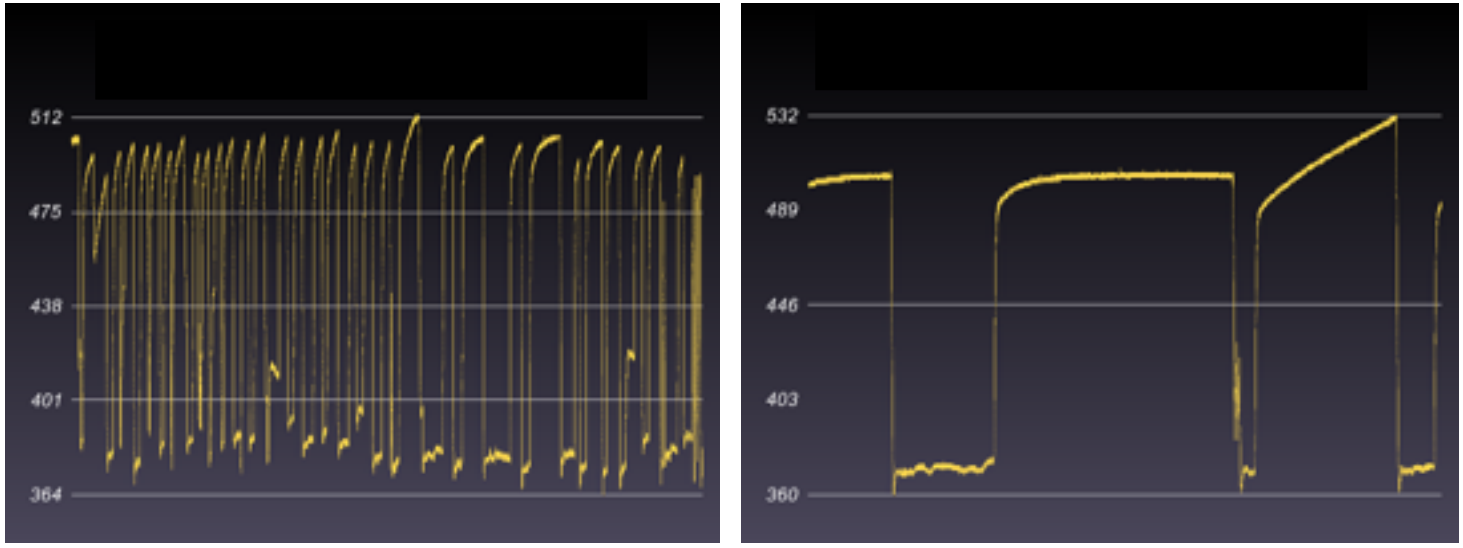
(253 Samples, 1 Example)

(LOOCV)

User Study :: Results

Can we do better?

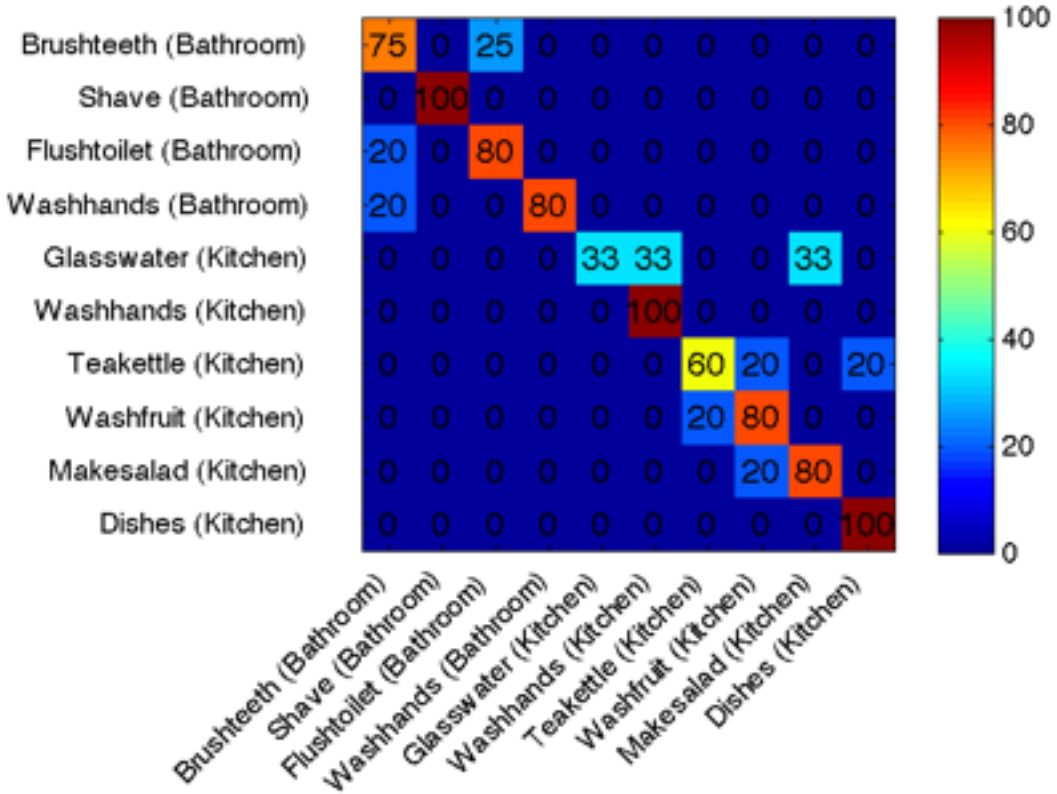
User Study :: Challenges



High Variability

Individuals carry out tasks differently

User Study :: Results (1 participant)



82.69%

Overall Accuracy

(54 Samples, 5 Examples)

(LOOCV)

Discussion & Insights

Infrastructure challenges

Could not leverage differentiation between hot/cold water sensors

Scripted scenario

Facilitated collection of ground truth data

Health applications

Good for holistic, entire-home monitoring

Activity Recognition + HCI

What is HCI?

Study of the interaction between humans and computers. Make this interaction natural, seamless, intuitive.

(Computing technology is everywhere)

We've just incorporated a new modality in how we interact with computing devices….

Activity recognition and sensing has been part of HCI for a long time….

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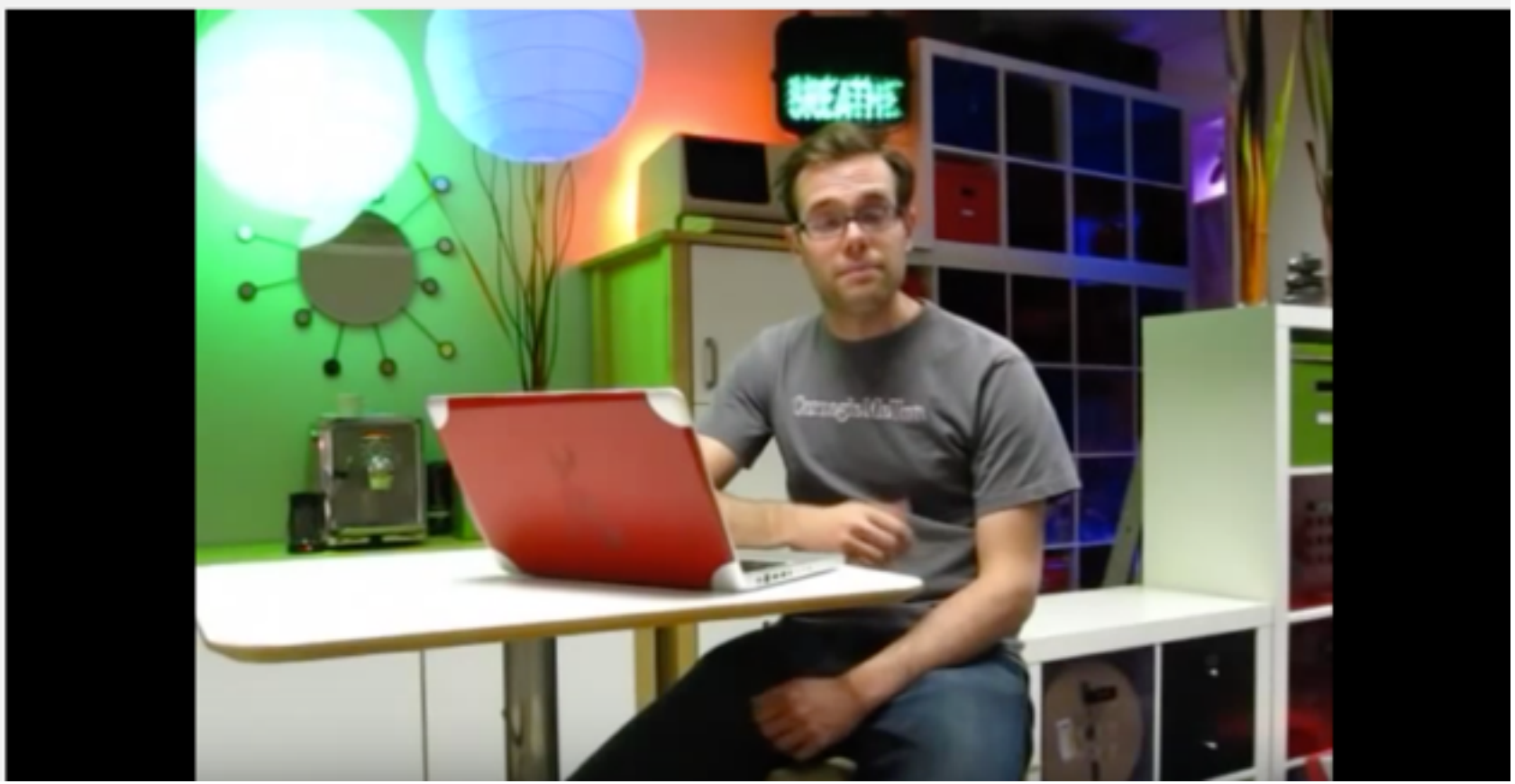

Panel of Experts + Papers