The Title of Final Presentation

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Introduction:

Good morning, my name is Alesha Morovits and today I would like to introduce you to application development with social gesture recognition.

(10 secs)

Social Isolation

Lack of connection with society

Definition: Social isolation

A significant issue today is social isolation. Social isolation is the complete or near complete lack of contact between an individual and society.

(15 secs)

Social Isolation: Symptoms

Depression

Anxiety

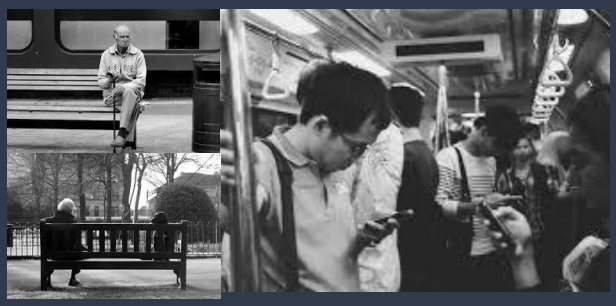
Irritability

Social isolation: Symptoms

The common symptoms of social isolation include, but are not limited to depression, anxiety, negative mood, and irritability.

(15 secs)

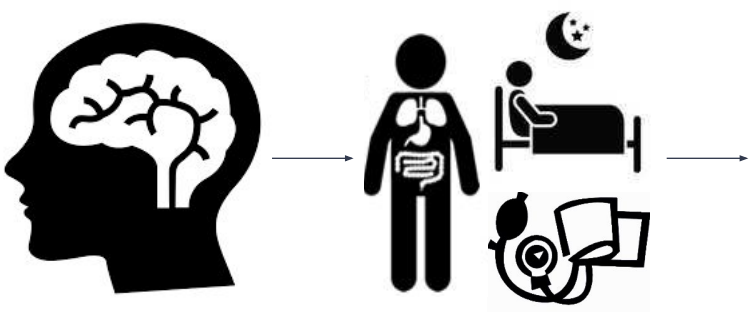
Why does social isolation matter?



If those who identify themselves as socially isolated... or even shy and introverted like myself feel more composed by themselves, why should society be concerned?

(15 secs)

Social Isolation: Risk Factors



Heart Attack

Stroke

Diabetes

Social isolation: Risk Factors

It turns out that the psychological effects of social isolation has serious effects on the body. (Click)

For instance, depression and anxiety have been proven to unfortunately impact an individual's blood pressure, sleep pattern, and even cause inflammation. (Click)

A combination (or just one) of these symptoms can lead to serious risk factors like heart attacks, strokes, diabetes, and more.

Related Work: Recognizing Daily Activities

Daily Activities

Not Defined Gestures

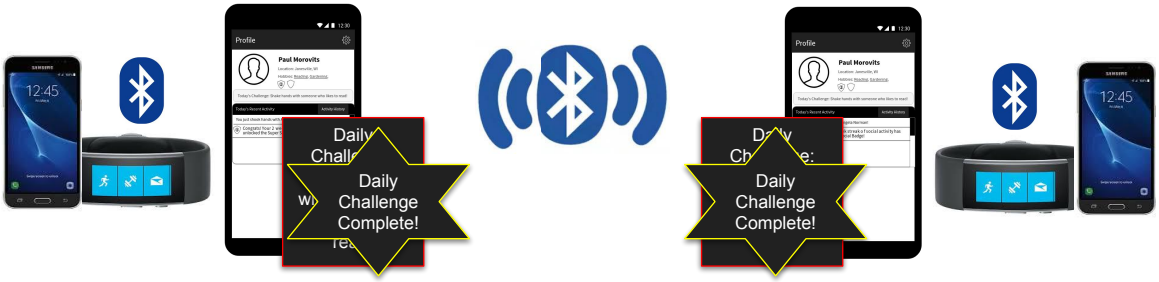
There have been previous work related to detecting daily activities such as running, walking, or dancing. Also there has been work which focused on detecting laughing or eating. The most important factor to keep in mind is that neither solution detects fine grained social gestures relevant to the soultion.

How can we combat social isolation?

So, in this particular time in society where technology seems to be the center of an individual's life... how can social isolation be prevented?

I think that if we combine technology and a technique to encourage socialization we can solve this problem. DUring this program I have been researching and developing an app called Stay Connected.

Stay Connected



User A... likes to cook and garden. This user will have their phone and smartband connected via bluetooth. The user will receive a challenge everyday. For instance to shake hands with someone who likes to read. (Click)

User B… likes to read and exercise. Their daily challenge is to shake hands with someone who likes to cook. Once User A and User B shake hands their challenges are completed. (Click)

Hypothesis

Social isolation can be decreased by using auto-detection of social gestures and apps that gamify social interaction

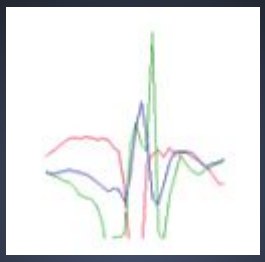
- Daily activities challenge user to interact with people.
- Badges encourage user to continue their interactions.

Such daily challenges, auto-detection of social gestures, and gamification will encourage the user to continue with the application.

How does the app auto-detect social gestures?

By using previous research about social gesture recognition we can implement an algorithm to display the gestures to the user.

Social Gesture Recognition: Labeling Data

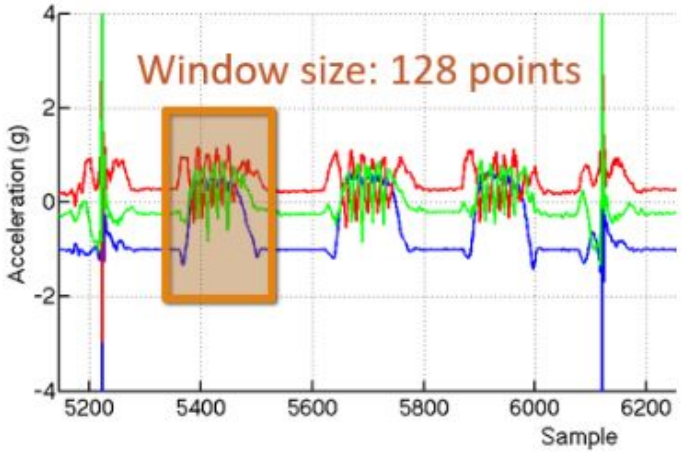


Accelerometer Data: Fist Bump

Gesture:	Description:
Celebratory Fist Pump	Users perform a fist pump gesture equated with excitement or celebration
High Wave	Users wave their right hand above their head
Hand Shake	Users shake hands with the research coordinator
Fist Bump	Users bump a closed fist with the research coordinator
Low Wave	Users perform a wave located close to the waist area
Point Straight	Users point straight ahead
Point Left	Users point to their left
Point Right	Users point to their right
Point Up	Users point up towards the ceiling
Motion Over	Users perform a gesture indicating come closer
High-Five	Users perform a high five with the research coordinator
Applause-Clap	Users clap as one would after a performance

A brief overview of this research provided begins by the use of a smart band and recording the accelerometer data of each gesture.

Social Gesture Recognition: Features



20 features per signal:

<u>11 time domain features</u>
Min, max, mean, std dev
Pairwise correlations
Zero, mean crossing rate
Skewness
Kurtosis
AUC
SNR

<u>9 Frequency domain features</u>
Signal energy
DFT coefficients

Features were then recorded to further identify each gesture.

Social Gesture Recognition: Classification

Advantages

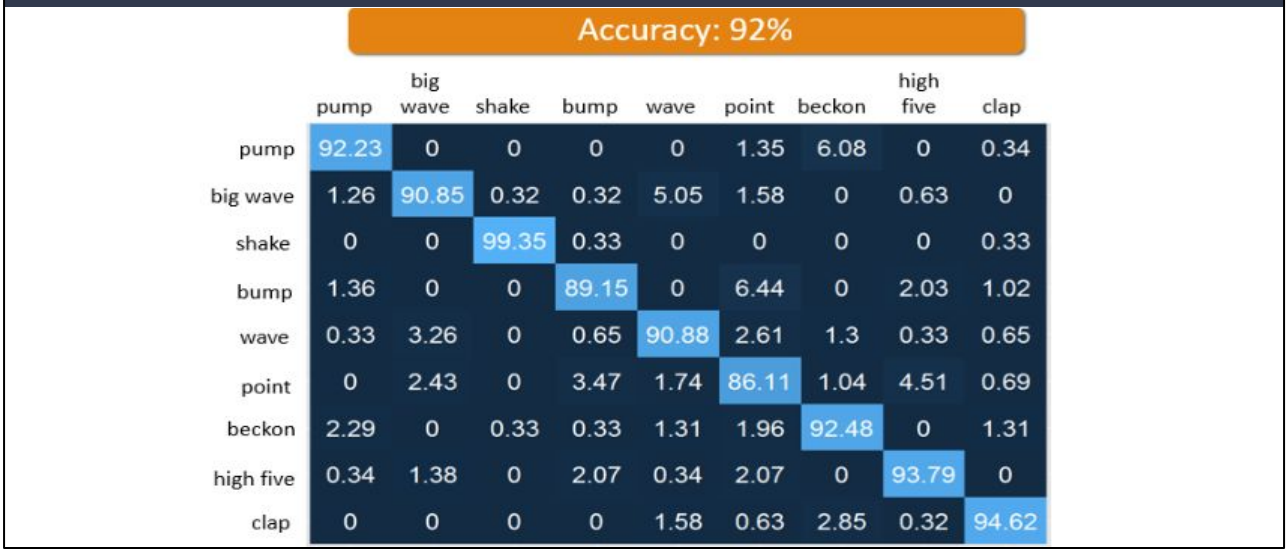
Less Computation

Smartband

Honestly this slide is not finished because I need to research more about logistic regression and classification.

Read up on logistic regression to fully finish slide

Social Gesture Detection: Confusion Matrix

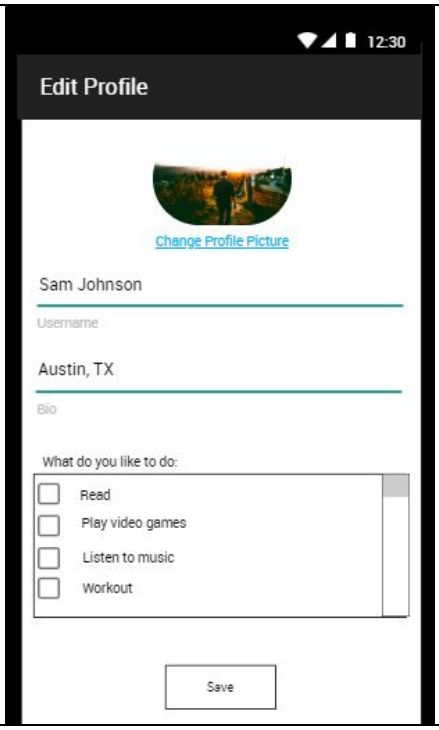


	pump	big wave	shake	bump	wave	point	beckon	high five	clap
pump	92.23	0	0	0	0	1.35	6.08	0	0.34
big wave	1.26	90.85	0.32	0.32	5.05	1.58	0	0.63	0
shake	0	0	99.35	0.33	0	0	0	0	0.33
bump	1.36	0	0	89.15	0	6.44	0	2.03	1.02
wave	0.33	3.26	0	0.65	90.88	2.61	1.3	0.33	0.65
point	0	2.43	0	3.47	1.74	86.11	1.04	4.51	0.69
beckon	2.29	0	0.33	0.33	1.31	1.96	92.48	0	1.31
high five	0.34	1.38	0	2.07	0.34	2.07	0	93.79	0
clap	0	0	0	0	1.58	0.63	2.85	0.32	94.62

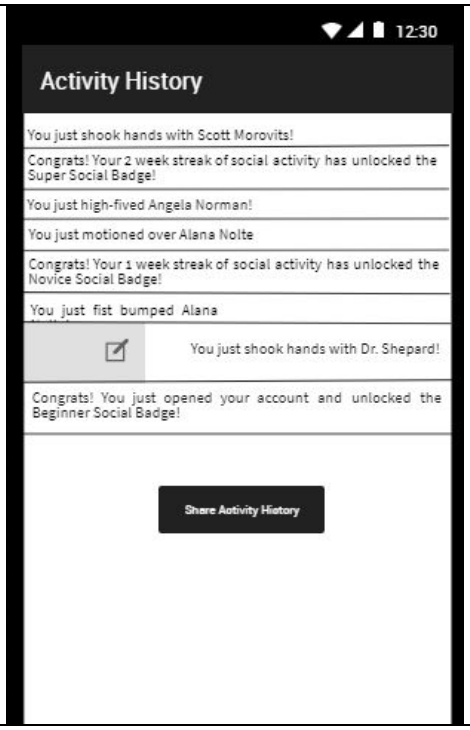
This confusion matrix shows displays the ground truth versus the classified. For example the handshake was accurately detected as a hand shake 99.35 percent of the time, while the handshake was mistakenly detected as a big wave 0.32 percent of the time.

User profile: displays name, location, hobbies, badges. The days recent activity.

From this screen the user has an option to edit the user profile and display their past history of activity and notes.



Within the edit profile they have the option to edit name, picture, and most importantly the hobbies that the use enjoys. This will ensure when the challenges are assigned the user is encouraged to meet new people outside of their comfort zone.



Within the activity history the user can add notes to a specific activity, or view past activity and awards achieved. The user also has the option to share their history by email. This could be useful if one would need to share their information with a specialist or even a family member.

Proposed User Study

Honestly I just was proposed to do this yesterday, and I have yet to fully complete a good outline for a user study.

Future Work

Implement social recognition algorithm.

Begin user study.

Detect concurraning social gestures.

Questions?

References

[1] Knighten, Jonathan, Stephen McMillan, Tori Chambers, and Jamie Payton. "Recognizing social gestures with a wrist-worn smartband." In *Pervasive Computing and Communication Workshops (PerCom Workshops), 2015 IEEE International Conference on*, pp. 544-549. IEEE, 2015.

[2] Oscar D. Lara and Miquel A. Labrador. "Survey on Human Activity Recognition using Wearable Sensors" *IEEE COMMUNICATIONS SURVEYS & TUTORIALS,* VOL. 15, NO. 3, THIRD QUARTER 2013

[3] K. K. Rachuri, M. Musolesi, C. Mascolo, P. J. Rentfrow, C. Longworth, and A. Aucinas, "Emotionsense: A mobile phones based adaptive platform for experimental social psychology research," in *Proceedings of the 12th ACM International Conference on Ubiquitous Computing,ser*. UbiComp, 2010, pp. 281–290.

[4] J. S. House, K. R. Landis, D. Umberson et al., "Social relationships and health," *Science*, vol. 241, no. 4865, pp. 540–545, 1988.