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Drunk User Interfaces: Determining Blood Alcohol Level through Everyday Smartphone Tasks

The main objective of this paper lies in **estimating a person's blood alcohol level (BAL) by measuring Human Performance through embedded sensors**. The authors also list other applications such as Drunk driving prevention and enforced by car insurance, bartenders refusing service, drunk texting prevention, self-awareness of how alcohol affects locus of control, etc.

Prior works : Some of the prior works have looked at human gait analysis using smartphones. However, such a method has an issue because a sober person may have to walk some distance to show the smartphone that he/she is not drunk. Another app that existed before needed another person to look at the app (in a well lit environment) to find out if a person was drunk - which may not always be possible. A third prior work looked at users self reporting their drunkenness along with other sensor data to come to a decision for three labels - not drunk, drunk, heavily drunk. However, the authors of this paper argue that such a method may not be a robust way of classifying and propose using regression based method to measure how drunk a person called Drunk User Interface (DUI). **DUI challenges a person to solve puzzles to prove they are not drunk and also collects data about the side effects of alcohol**.

Methods of DUI : The authors use 5 types of DUI for the experiments - Typing, Swiping, Balance + Heart rate, Simple reaction to a stimulus, Choice reaction.

They however talk mainly about Typing and Simple reaction task in more detail.

1. **Typing** : The user has to type out simple sentences. The UI looks at the accuracy of typing out the sentence to figure out the coordination of the person. It classifies the keystroke as correct, incorrect but fixed, incorrect and not fixed, fix (delete key). Using these 4 parts, they use a metric called utilized keystroke bandwidth

   Sensor : Looked at acceleration, gyroscope data to make more observations.

2. **Simple reaction task** : Touching the screen when screen turns green - to see how fast they touch.

Sensor : Looked at movement of phone, etc.

The whole task would take 5-10 minutes.

The authors use Random Forest regression for BAL prediction. They also looked at mean and standard deviation features. For the experiments, the subjects were asked to consume alcohol at equal intervals and the tests were performed.

Study 1 : Recruit on a single day and make them perform the tasks - pearson coefficient of 0.96.

Study 2 : Recruit them on multiple days and make them perform a single task - choice reaction task (r=0.95) performed the best.

Study 3 : All tasks, all trials : The authors found their method to have a Sensitivity of 93.9% and specificity of 82.3%.

However, there were a few points that needed more clarity :

Questions :

1. Understanding the side effects of alcohol is not a new topic. There have been other works that have done this previously. Something that can quantify the drunkenness would have been useful.
2. The symptoms of a person who is tired can sometimes resemble a person who is drunk. The authors claim that their model is not robust enough to distinguish between the two. How would they do it if given another chance?
3. Can the user circumvent the typing test by using voice typing instead of typing on the keyboard?
4. The test is user specific and won't work for a random person. How do the authors address this issue?
5. Breath analyzers are not the best measurements for BAL. The authors claim Intravenous, in-the-wild methods perform better.

More details about the paper

Mariakakis, A., Parsi, S., Patel, S. N., & Wobbrock, J. O. (2018, April). Drunk user interfaces: Determining blood alcohol level through everyday smartphone tasks. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (pp. 1-13).