# User Identity Verification via Machine Learning, using Keystroke and Mouse Dynamics

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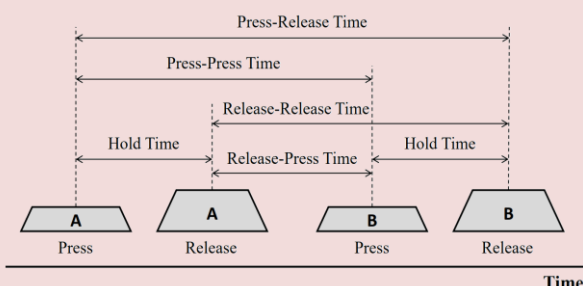Nicholas Kecojevic - 1413706
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## Aim

The aim of this project is to verify the identity of a user by comparing specific attributes from mouse and keyboard inputs, using a database of known user attributes. The unique feature of this project is that it is a novel approach of combining both input sources to make a more comprehensive system.
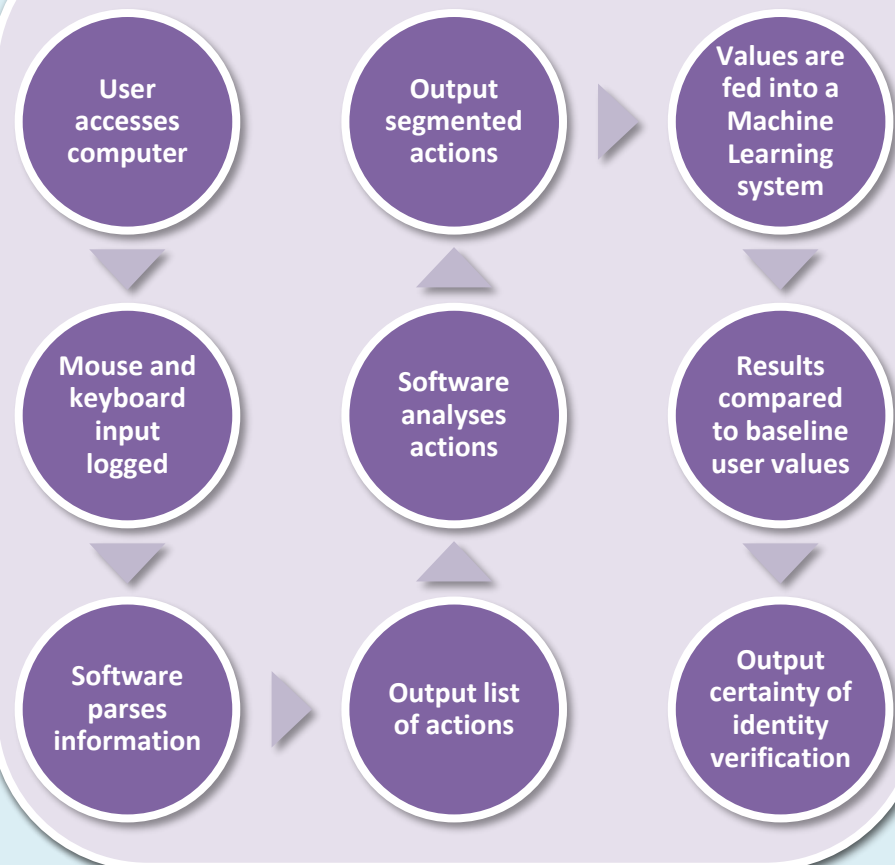
## Preliminary Data Analysis

15 characteristics have been identified as potential features to represent a user. Some sample features are:

- *Movement/Drag Path length mean*
- *Velocity mean*
- *Click length mean*
- *Words per minute*
- *Individual finger movement speed*
- *Key-press/release latencies*



## Methodology

- **User accesses computer**
- **Mouse and keyboard input logged**
- **Software parses information**
- **Output list of actions**
- **Output segmented actions**
- **Software analyses actions**
- **Values are fed into a Machine Learning system**
- **Results compared to baseline user values**
- **Output certainty of identity verification**

## User Action Analysis

Below we can see an example of the software analysing actions from the logged information. The blue line represents the original mouse line, the orange represents the segmented actions, each orange point is the start of a new action. 37 segmented actions were defined from 482 log entries.
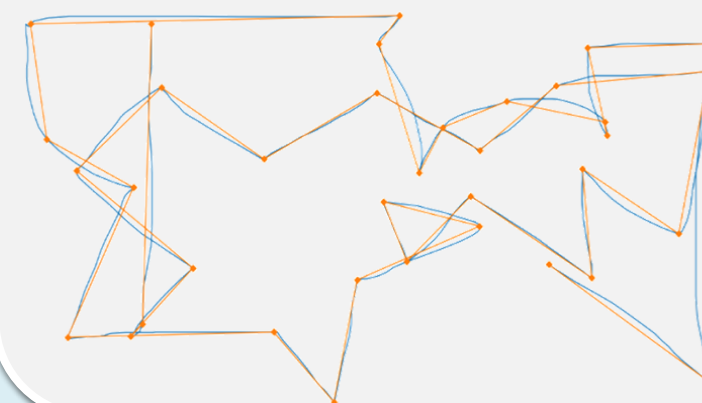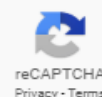


## Conclusion

Mouse dynamics are already implemented in some ways, such as Google's reCAPTCHA. Keystroke dynamics are not as wide spread, but early results show that combining the two methods, will result in an accurate verification method.

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*Feher, C., Elovici, Y., Moskovitch, R., Rokach, L. and Schclar, A., 2012. User identity verification via mouse dynamics. Information Sciences, 201, pp.19-36. Available through: https://citeseerx.ist.psu.edu/ [Accessed 5 March 2020]*

*Kaminsky, R., Enev, M. and Andersen, E., 2008. Identifying game players with mouse biometrics. University of Washington. Technical Report. Available through: https://pdfs.semanticscholar.org/ [Accessed 5 March 2020]*

*Teh, P.S., Teoh, A.B.J. and Yue, S., 2013. A survey of keystroke dynamics biometrics. The Scientific World Journal, 2013. Available through: https://hindawi.com/ [Accessed 5 March 2020]*