

ABSTRACT

THESIS: Smart Device User Behavior Classification and Learning with Hidden Markov Model

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Today, millions of people use smart phones because smart phones are convenient to access various online services, such as online social networks, online banking and emails. People usually use passwords for authentication, but passwords are also the major source of security vulnerabilities, which are easily to be guessed and re-used. So, protecting a user's privacy on mobile is never trivial. Another issue with passwords is the usability in that users have to repeatedly enter passwords or pins. Therefore, it will be tremendously beneficial if a non-password authentication can be offered.

In this thesis project, we propose a stochastic non-password authentication solution that models users' finger gestures and handholding patterns as users' profiles using Hidden Markov Model (HMM). The system leverages the data collected by three sensors on mobile devices: accelerometer, orientation and touch screen input measurements, and then trains an HMM user profile model. This solution is a software-only approach that does not require any authentication hardware such as fingerprint sensor. The solution employs machine learning algorithms to passively re-use the data provided by existing sensors equipped on devices. This project is implemented and evaluated on Android devices for performance assessment. In the experiment,

we verify the accuracy of authentication. The result shows high accuracy by using more sensors since HMM has been reported of 89% accuracy in image-based gesture recognitions.