Enhancing Mobile Device Authentication with Behavioral Biometrics

Han Gil (Paul) Jang
Washington and Lee University

Dylan Carlson
Lake Superior State University

Mengjun Xie
University of Arkansas Little Rock

Motivation

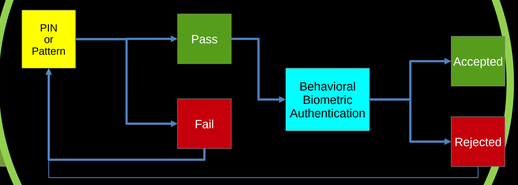
- Prevalence of mobile devices
- Weaknesses of popular authentication methods (PIN and draw patterns)
- Usability issues with current improvements on password.

Our Work

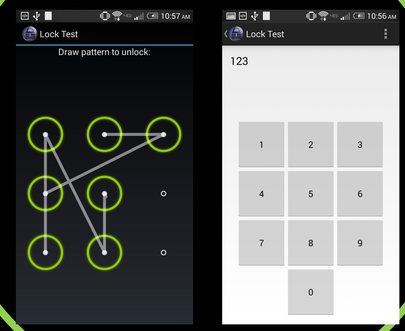
Leverage readily available behavioral biometrics to enhance authentication methods on mobile devices.

Our approach does
- Not affect usability
- Not require additional hardware
- Provide another authentication factor

Authentication Process



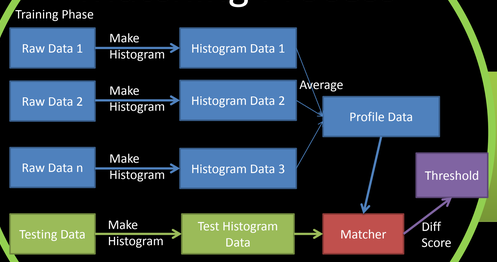
Data Collection



Collected Features

- X,Y coordinates
- Pressure
- Area
- Acceleration
- Angular acceleration
- Pass/Fail
- Distance
- Angle
- Derivatives of features

Matching Process



Results (I)

FAR rate (with 10% FRR)
# of Users: 16, # of test samples: 30

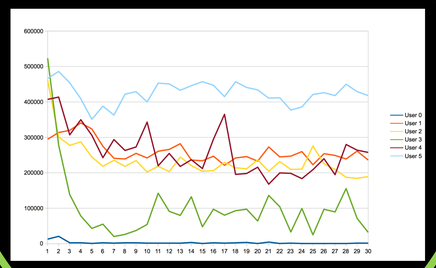
Phone Session 1:
- Simple Pattern: 7.68%
- Complex Pattern: 6.20%
- Simple Pin: 12.77%
- Complex Pin: 5.77%

Phone Session 2
- Simple Pattern: 7.86%
- Complex Pattern: 8.79%
- Simple Pin: 8.94%
- Complex Pin: 9.13%

Tablet Session 3:
- Simple Pattern: 8.86%
- Complex Pattern: 5.98%
- Simple Pin: 3.89%
- Complex Pin: 2.12%

Results (II)

Difference score for each attempt



Conclusion

1. Our approach currently achieves EER (equal error rate) of less than 10% and in many cases lower than 5%.
2. Enhancing user authentication with behavioral biometrics is very promising.
3. Improvements can be made by
   - Tuning the parameters for feature processing and comparison.
   - Pruning and adding to the current feature set.

Acknowledgment:
NSF CyberSAFE@UALR REU Site
(Award #: CNS-1359323)