Informing Guessing Attacks on Publicly Performed Secrets

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Outline

Motivation
Experimental setup
Simple patterns
Complex patterns
Next steps
Motivation

• Research question: can information about passwords be obtained by observing a person unlock a mobile device at a distance?

• Similar efforts in recent research:
  • Focused on hand/finger observation at close distance where device is observable (Ye et al., 2017)
  • Used other methods (accelerometer) to obtain information from publicly performed secrets (Owusu, Han, Das, Perrig, & Zhang, 2012)
Experimental Setup

Step 1: Camera work

• Two camera orientations
  Side: Back:

• Two tracking points
  • side orientation: elbow & wrist
  • back orientation: elbow & shoulder
Experimental Setup

Step 2: Motion tracking

• Software: Kinovea (open source video analysis)
Experimental Setup

Step 3: Data visualization

XML
Output from motion tracking software

Java
Extracts tracking info from XML, discards the rest

R
Creates plot using information from Java program
How to read a movement plot

Gesture performed:

Starting Point

Elbow
Wrist

Starting Point
Simple patterns

<table>
<thead>
<tr>
<th>Pattern performed</th>
<th>Direction of wrist motion</th>
<th>Direction of elbow motion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up</td>
<td>up-right</td>
<td>down-right</td>
</tr>
<tr>
<td>Down</td>
<td>down-left</td>
<td>up-left</td>
</tr>
<tr>
<td>Left</td>
<td>up-right</td>
<td>down-right</td>
</tr>
<tr>
<td>Right</td>
<td>down-left</td>
<td>up-left</td>
</tr>
</tbody>
</table>

**Up (Side View)**

**Down (Side View)**

**Left (Side View)**

**Right (Side View)**
Simple patterns

- Side orientation
- Four diagonal movements (upleft, downright, upright, downleft)
Moving on to more complex patterns

<table>
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</tr>
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<tbody>
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<td>up-right</td>
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Next steps

- 3D depth sensing using Project Tango tablet or Kinect
  - Differentiate more clearly between “up” vs. “left” and “down” vs. “right"
- Analyze data from back orientation
- Expand dataset to include a more diverse group of subjects
- Create movement classifier
Acknowledgements
References
