

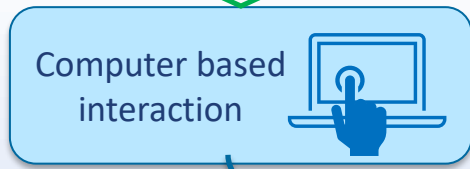
Cognitive Modelling for Human Performance Evaluation of Cyber Security Systems at Scale

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Modelling human performance

& Cognitive models

Challenges



- ✓ GOMS (Goals, Operators, Methods, and Selection rules)
- ✓ KLM (Keystroke Level Modelling)



- Automatic large scale modelling
- Modelling dynamic user interactions and user interface (UI)
- Mixed probabilistic models

CogTool+: An open-source software for large scale human performance modelling

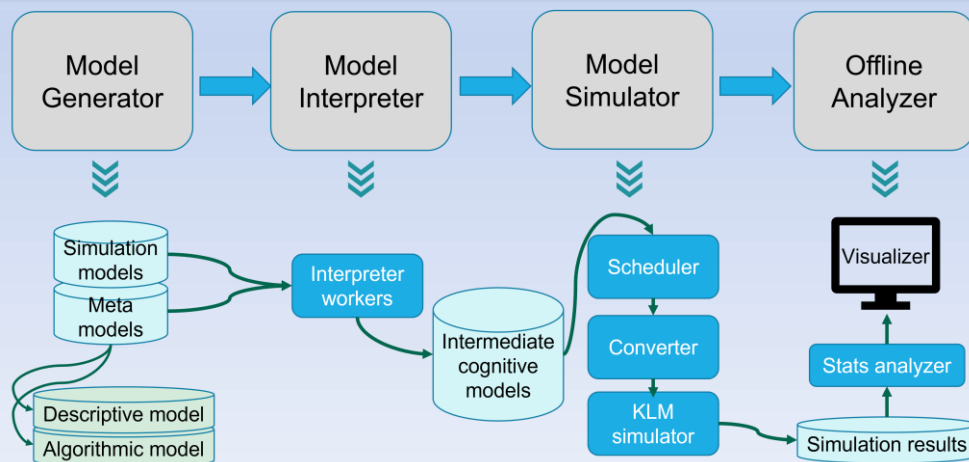


Fig.1. CogTool+ software framework

- Model systems with complex UI
- Model human behaviours
- External data driven modelling
- Large-scale human performance modelling
- Mixed probabilistic model
- Open source software on GitHub



Modelling 'Undercover'

Modelling 6-digit PIN entries

- An observer-resistant password system (ORPS)
- Complex user interaction and UIs
- Different visual-search patterns
- Human behavior insights

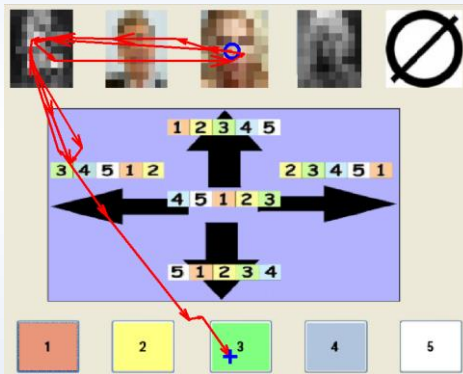


Fig.2. eye tracking gaze data on Undercover UI

- Most common user-authentication method
- Inter-keystroke timing attack on PINs
- 50 users enter 50 different 6-digit PINs

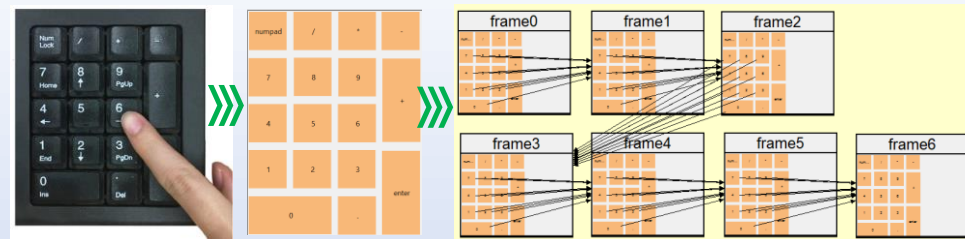


Fig.4. Illustration of high-level UI modelling for 6-digit PIN entry tasks

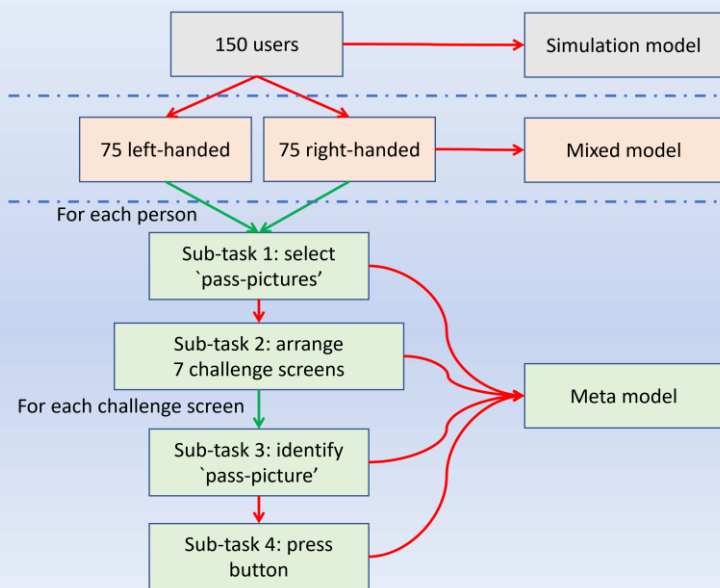


Fig.3. Flowchart of modeling Undercover using CogTool+



Fig.5. Comparison between simulated data and real human performance data for (a) PIN '000533' and (b) PIN '100086'

