Error-tolerant authentication

Improving usability of text-based passwords via keystroke dynamics

Misamatti Koistinen
Aalto University

Motivation

- Text-based passwords remain as the most prevalent authentication factor on online applications
- Passwords impose high cognitive burden on users (vast amount of services with strict & incoherent security policies)
- Increased security usually lowers usability
  → users circumvent the security requirements
- Could we increase usability without the loss of security?

Current progress

- Running prototype ready
- Dataset collection underway (login attempts with keystroke timing data)

Objective

- Use biometric user verification via keystroke dynamics during password login
- Apply error-correction on the password input based on biometric confidence
- Authenticate user without prompting to retry the login process

Hypothesis

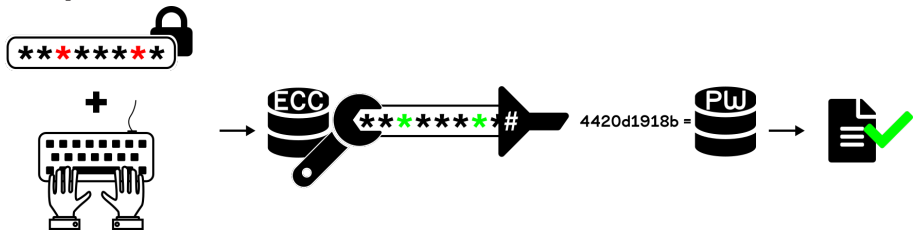
- Less rejected login attempts to improve usability
- Lost password entropy feasibly supplemented by biometrics
- Non-intrusive from the user's perspective
- Applicable to online settings

Concept

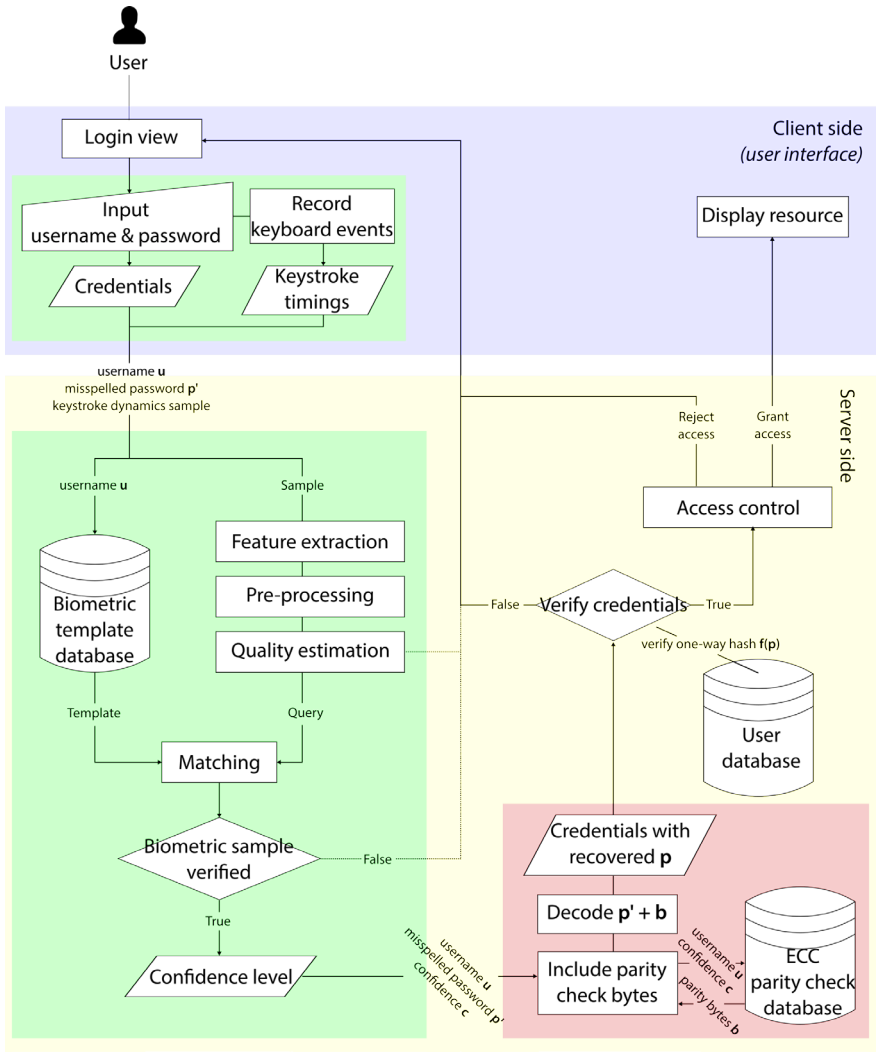
Normal password authentication

1. User inputs password with errors
2. Login submitted to server
3. Password hash mismatch
   → access rejected

Proposed solution



1. User inputs password with errors
   - Key event timings recorded during typing (biometric sample)
2. Login + keystroke timing data submitted to server
   - Biometric sample verified against user template
   - Apply error-correcting code on input to attempt retrieval of original password
3. Password hash matches
   → access granted



Process flow of the system prototype

Steps

- **Registration**
  - Password is encoded with Reed-Solomon code with varying error-correction capacity $t = \{1, 2, 3\}$
  - Parity bytes stored separately from password hash
- **Initialization**
  - First n logins collect keystroke dynamics template
- **Authentication**
  - Keystroke dynamics timing data recorded
  - Biometric features extracted from the data
  - Classifier result to yield a confidence level
  - Corresponding error-correction applied to password

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