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| Eyes, Window to the Soul or Key to Your Computer?  Towards Eye Movement Based Authentication | | |
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| *Abstract:* | | |
| Password and dual-factor authentication are often considered cumbersome as they require memorization and timely access to multiple electronic devices. Biometric authentication, on the other hand, provides a convenient way to identify users based on their physical or behavioral characteristics. The way we move our eyes across text or images is influenced by physical and cognitive factors, which makes eye movement an excellent tool for contactless biometric authentication. Eye movement-based authentication is especially viable since the pervasive introduction of eye trackers and cameras in everyday devices, such as smartphones and virtual reality headsets. Compared to othe­r forms of biometrics such as fingerprint, sound recognition, and facial recognition, eye movement is more difficult to replicate, because it involves both physical characteristics and cognitive features. Since the COVID-19 pandemic, the contact-free property of eye tracking authentication in public, such as train stations, ATMs, and shopping malls, has become more necessary than ever.  Past research has demonstrated the practicality of eye movement-based biometrics, but only achieved a moderate accuracy. In this project, with the aid of machine learning, we aim to accomplish a more accurate performance in eye movement-based authentication. Unlike previous research where only physical eye movement features were used in identifying users, we take cognitive and linguistic features in consideration. Features such as word frequency and length, in combination with the efficiency of information retrieval in the human brain, determine the eye movement behavior during reading. Therefore, we utilize Natural Language Processing and Machine Learning to identify participants based on their eye movement data. To test our system, we use an existing large eye movement dataset collected from more than 300 participants at Facebook Reality Labs. We hypothesize that using a combination of physical and cognitive features when reading text would increase the accuracy of identifying participants based on their eye movement. | | |