Institute for Visualisation and Interactive Systems
Chair for Human-Computer Interaction and Cognitive Systems
Prof. Dr. Andreas Bulling

Hauptseminar "Privacy-aware Eye Tracking"

Introduction

Eye tracking technology has become increasingly prevalent in applications ranging from traditional user interfaces to virtual and extended reality. Eye trackers, as simple as a camera, could easily track where people look at, namely gaze data. The gaze data is highly privacy-sensitive, as it could reveal various user data, such as cognitive states, health conditions, and personal traits.

This seminar explores the privacy implications of eye tracking and the methods to mitigate associated risks. We first examine why gaze data is particularly sensitive and the types of privacy attacks that can exploit it. We then explore state-of-the-art defences, covering both usable security measures and cryptographic techniques for gaze data. In the seminar, students will read, present, and discuss papers on privacy-aware eye tracking. By the end of the seminar, students will gain a comprehensive understanding of privacy risks in eye tracking and how to address them.

Learning goals

The goal of the seminar is to familiarize students with exciting new research topics in the area of privacy and eye tracking. Moreover, the seminar teaches basic scientific writing and oral presentation skills. After completing the seminar, students will have acquired theoretical knowledge about generic privacy-preserving techniques, the privacy-sensitive aspects of eye tracking technologies, the risks of information leakage and the corresponding legal and social concerns, the use of eye tracking in identification and authentication protocols and how to leverage such understanding to develop privacy-aware eye tracking systems.

The core competency acquired through this course is a solid foundation in theoretical computer science, human-computer interaction, computer vision, and machine learning (particularly deep-learning) algorithms.

Implementation

The seminar will have a different structure from regular seminars to encourage more discussion and a deeper learning experience: We will use a case-study format where all students read the same paper each week but fulfill different roles and hence prepare with different viewpoints in mind:

- **Historian**: Find out how this paper sits in the context of the related work. Use bibliography tools to find the most influential papers cited by this work and at least one paper influenced by the work (and summarize the two papers briefly).
- **Industry Person:** Give a quick pitch (usually 3-5 minutes) about the core of the paper, with a focus on practical aspects, such as algorithm complexity and efficiently, cost and sustainability, and how the technique could be used in certain products or services.

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- **Presenter**: Give a full talk (usually 15-20 minutes) about the paper that you read in depth.
- **PhD student**: Propose a follow-up project for your own research based on this paper - importantly the project should be directly inspired by the paper or even use/extend the method proposed.
- **Journalist**: After the presentation, write an article about the paper that can be understood by the general public; include points from the general discussion during the seminar, the historian, or the PhD student

- **All students** (every week): Come up with an alternative title; did the paper miss anything? What are its key limitations?

Requirements

This research seminar is intended for **Master students** in Computer Science, Visual Computing, Media Informatics, and Computational Linguistics. Students should have a **good understanding of human-computer interaction, computer vision, and/or machine learning**. **Prior attendance of lectures in these areas is required**. Attendance in the weekly meetings is mandatory. The final grade will be composed of individual grades for the respective task each week as well as active participation in the discussions.

Date & Time

Mondays, 9:45-11:15, SimTech 00.009 (Pfaffenwaldring 5a)
Available space: 15–25 students

Term

SS 2025

Language

English

Contact

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