

Advanced Seminar: Identity Science

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da/sec - Biometrics and Security Research Group, Hochschule Darmstadt

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Contact and Website

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`https://dasec.h-da.de/advanced-seminar-masterseminar-ws-2025-26/`

Procedure

- ▶ Students select preferred topics and groups (up to 2 students depending on the topic)
- ▶ Required materials will be handed over by the supervisors: databases, software, evaluation scripts etc.
- ▶ **Progress reports** have to be sent to the supervisor(s) before the following dates:
 - 1) 30th November
 - 2) 18th January
- ▶ Additional appointments shall be arranged individually and on demand.

Procedure (cont'd)

- ▶ Each group has to prepare a term paper (6-8 pages) using the IEEE conference template: <https://www.ieee.org/conferences/publishing/templates.html>
- ▶ The term paper must be submitted by **1st March**
- ▶ The final presentation will be 45 minutes per group + 15 minutes discussion of the results
- ▶ Suggested dates for the final presentations: **mid March** (Doodle voting)
- ▶ A grade will be given based on the term paper and final presentation.
- ▶ 15-30 Citations.
- ▶ Introduction, related work (one third), method, evaluation.
- ▶ Images and tables.

Overview

- ▶ Prompt design to improve face image descriptions.
- ▶ Semantic analysis of face images using facial landmarks.
- ▶ How trustworthy are LLMs for analysing biometrics?

Prompt design to improve face image descriptions

Regulations regarding the use of AI require that automated decisions affecting people can be reversible when users do not agree. Today, face-recognition outputs are often not interpretable by operators. Therefore, developing methods to translate biometric features into information that users and operators can understand is a priority.

- ▶ **Tasks:** Train a LLM to describe face images.
- ▶ Optimize prompts to get accurate objective descriptions.
- ▶ Evaluate outputs against an annotated dataset provided.
- ▶ **Documentation:** Term paper, presentation
- ▶ **Handout:** Literature, accuracy scores
- ▶ **Supervisors:** C. Rathgeb, A. Real



An attractive young woman with brown wavy hair, a pointy nose, and has heavy makeup on face, wearing lipstick, and her mouth slightly open.

Semantic analysis of face images using facial landmarks

Facial images are often described using adjectives (e.g., large eyes, small nose); to extract these characteristics objectively, facial landmarks can be used and the features of face images can be statistically classified to produce accurate labels.

- ▶ **Tasks:** Perform face detection and landmark inference.
- ▶ Statistical analysis and classification of attributes.
- ▶ Dataset with labels.
- ▶ **Documentation:** Term paper, presentation
- ▶ **Handout:** Labelled dataset
- ▶ **Supervisors:** C. Rathgeb, A. Real



How trustworthy are LLMs for analysing biometrics?

Measuring and mitigating bias in systems is used to ensure fairness, which guarantees that users from different backgrounds or social groups are given similar treatment. Past examples have shown that inequality was exacerbated for users from different backgrounds by LLM-aided resume screening and healthcare tools.

- **Tasks:** Create an inclusive dataset (gender, age, ethnicity, etc.)
- Measure per-group performance.
- Propose mitigation actions to improve fairness.
- **Documentation:** Term paper, presentation
- **Handout:** Review metrics, mitigation report.
- **Supervisors:** C. Rathgeb, A. Real

98.7%	68.6%	100%	92.9%
98.7%	77.5%	100%	93.6%
			
DARKER MALES	DARKER FEMALES	LIGHTER MALES	LIGHTER FEMALES

Select your own topic

- ▶ Students are also invited to proposed their own topic!

Topic selection process

- ▶ Send your topic choice to christian.rathgeb@h-da.de by the end of the week
- ▶ First come, first serve – so you might choose more than one topic (1st and 2nd choice)