

Task 1.1: Case study for AI and Society

AI Based Proctoring System

1. Introduction

Owing to increased hardware/computational capabilities, Artificial Intelligence (AI) is now finding its applications into various domains. Huge amount of organically generated data acts as a fuel to the applications of AI. One such application is AI based Proctoring System (AIPS); online proctoring systems (OPS) as described in [1] have been on the rise since the COVID-19 pandemic. Institutions and organizations are strengthening their digital infrastructure to tackle hurdles arising from work from home settings. OPS use online tools and AI in combination with a human proctor (in some cases the proctoring system is completely AI based, discussed in detail in [1]).

2. AI Based Proctoring System

Traditional OPS use web-camera along with device microphone to monitor candidates. A remote human proctor monitors several such candidates are instructed to allow device permissions for proctoring. While OPS tackle the hurdle of work from home settings, they require manual workload which can become cumbersome for large assessments like college examinations or nation-wide skill assessment tests. AIPS use video frames and audio signals to flag possible cheating scenarios, this either reduces the workload of human proctor or automates the process entirely.

There are several AI modules that contribute towards working of an AIPS:

- i. **Face Detection:** The face detection module works on raw video frames to detect candidates faces and mark the ROI. This ensures that there is only a single person taking the test and no additional person is visible. Some systems use an additional person detector to monitor presence of an additional person even when no face is visible.
- ii. **Face Recognition:** The face detection module sends the face to the recognition module where it is compared against a base image. Face recognition module ensures genuine candidate by having a base image of the candidate from either the intuition or ID card of the student.
- iii. **Speaker Identification:** In many AIPS a speaker identification block is also used to flag cheating scenarios where candidate takes external help with someone speaking offscreen. The speaker identification module segments out the human voice and compares it against the candidate's voice, in case of a mismatch, the candidate is flagged for a possible cheating scenario.

3. Ethical and moral considerations

Because of the sensitive nature of the data being processed, AIPS is prone to ethical concerns like violating user privacy and maintaining strong safeguarding measures to handle data privacy and safety.

Robust methods like using differential privacy and strong data protection measures are key to ensuring that there is no data breach. Moreover, the user needs to be intimated in a transparent way about the data collection process. Legislative methods like GDPR compliance are also ensuring data privacy and safety.

Apart from safety concerns discussed, the AI modules are also prone to biases emerging because of representation in of different groups in data. Face Recognition and face detection modules are prone to gender and ethnicity bias as shown in [2].

To handle such cases, the principles of ***inclusiveness, transparency, accountability, and fairness*** must be used as guidelines when designing AI based solutions. Moreover, a strong screening measure is essential to ensure different groups are represented fairly in the dataset. Moreover, the trained model must be exposed to testing which includes parameters like accounting for biases due to gender and ethnicity.

4. References

[1] A. Nigam, R. Pasricha, T. Singh, and P. Churi, "Correction to: Systematic Review on AI-based Proctoring Systems: Past, Present and Future," *Education and Information Technologies*, Dec. 2021, doi: 10.1007/s10639-021-10846-z.

[2] D. Leslie, "Understanding bias in facial recognition technologies," SSRN Electronic Journal, 2020.