A

Report on

Machine Learning System Design (MLSD) of

Automated Online Proctoring System

Submitted by:  
**Sushant Gautam - 076MSIISE20**

Submitted to:

Course Instructor

for Applied Machine Learning (EX852-Co1)

MSc in Informatics and Intelligent Systems Engineering

Department of Electronics and Computer Engineering

Institute of Engineering

Thapathali Campus

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# Introduction

This report overviews Machine Learning System Design (MLSD) for Proctortrack: an Automated Online Proctoring System. Proctortrack is one of the online proctoring systems that can authenticate, authorize, and control remote examinations, one of the essential components of a distant learning program. Universities and educators need a concrete solution that does not let them compromise with educators' and students' security, experience, convenience, and feasibility. MOOCs already use multiple mature proctoring solutions, but there exists a considerable gap that emerging technologies like artificial intelligence and machine learning can fulfill, reducing cumbersome human involvements.

# Focus Area

The main aspects of exam proctoring, which uses Machine Learning, are detecting identity fraud, analyzing cheating behavior, and discovering content theft. Various emerging algorithms from computer vision and natural language processing serve these areas, and the list includes Pattern Recognition, Voice Recognition, Facial Recognition, Eye Movement Detection, Plane Detection, and Mouth Detection. Such systems use multiple algorithms that work either in real-time or offline, for example, examining recorded video feeds.

# Metrics

## Accuracy

It is a crucial metric to judge the system in the production world. There is always a question about the chances for fraud cases that the system can miss. Likewise, this metric is equally vital in the research domain, and we are always interested in getting the maximum score with our algorithm in the dataset we use.

## Scalability

The proctoring system needs to be very scalable as there can be students are taking examinations simultaneously. If the server receives a large number of real-time audio and video feeds, there will be many complexities, impractical bandwidth requirements, and computations on the server-side. So, for scaling the system, there is a need for client-side computing methods and algorithms to reduce overhead in the server. East real-time processing is possible; such a system can effectively reduce cheating behaviors in the running examinations.

## Security

The system needs to provide a good level of protection against the promised level of fraud and cheating. It is also essential to consider what level of attorney the automated system has against the normal human proctor. If the system can demotivate examinees when they try to cheat, it would be very effective then such a system can bring an actual value to the table. Machine learning system design should be done not to be many loopholes from where examinees can trick the system.

## Reliability

The system should be reliable and less prone to failures so that it can help during examinations. Minor downtimes and failures can lead to significant consequences, so MSLD should address every possible situation. Stakeholders will always question the use of machine learning systems as there are other probable options like doing traditionally with human power. Therefore, the system should justify machine learning by proving out to be very efficient, outperforming human power if used for the same purpose.

## Mimicking human behaviour

Real human proctors are the ultimate metrics that we are going to compare this system. So, our system should mimic humans because all the metrics to evaluate this system should be around the fundamental human capabilities or even beyond.

## Creating a more intelligent AI system

The overall goal of machine learning system design is obviously to design an intelligence system. However, it should also be kept in mind that if our system can replace the traditional way of doing things more effectively and efficiently and without significant consequences in extreme pitfalls. Just imagine what would happen if our facial recognition module falsely prevents lots of students from attending a critical online examination.

## Adaptability

It is also a critical metric to be considered while designing machine learning systems. The system that we design should be widely adaptable around the globe. For example, if faces of only one kind of human race are used to train the system for facial recognition, then it might fail with students from another part of the world. The system should also comply with legal policies from around the globe. For example, some countries may not allow third party systems to store privacy related information.

# Conclusion

The remote proctoring system including Proctortrack has been evolving rapidly with the advent of machine learning and is already being used in online examinations system. There are multiple challenges that this system can face and should be considered carefully using during machine learning system design. Explained above are some of the most important aspects that should be carefully considered while designing this system to prevent significant pitfalls and fallbacks. As explained, there are two perspectives from which these metrics should be evaluated: one is from the deployment side, and the other is from the research side. Both have their own goals and expectations and are equally important for the success of these systems.

# References:

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