# Cheat me not: automated proctoring of digital exams on Bring-Your-Own-Device

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# Cheat Me Not: Automated Proctoring of Digital Exams on Bring-Your-Own-Device

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## ABSTRACT

Detecting fraud in digital assessment is currently done by human proctor, that observes recordings of the exam. This is costly, tedious and time consuming process. In this paper we present preliminary results on automated video proctoring, which has the potential to significantly reduce manual effort and scale-up digital assessment, while retaining good fraud detection.

## CCS CONCEPTS

• **Social and professional topics → Student assessment**;

## KEYWORDS

digital assessment, automated proctoring, higher education

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## 1 INTRODUCTION

Our society is increasingly becoming digital. Educating students for such a digital world entails that assessing their skills should be firmly embedded inside this digital world [3]. In digital assessment a student is tested on a computer. This closely resembles the natural problem solving environment where students learn and practice.

The University of Amsterdam has recently proposed a digital bring-your-own-device (BYOD) assessment taken either at a university location or at home. To prevent cheating, the student laptop screen is video recorded during the exam and afterwards the video content is inspected by a proctor who signals and flags unauthorized actions. Online remote proctoring enables (1) more authentic exams by allowing open resources, (2) use of BYOD in a regular lecture room, (3) off-campus online exams as a part of an online program, for example, at home anywhere in the world [1]. Currently, the proctoring is done by hand, by observing the computer screen recordings of the students. To save time and resources, and also to make this form of proctoring more accessible to larger group of users, there is a strong need to automate the proctoring process.


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In this paper we investigate how to partially automate the proctoring process. By using the recordings of the screen, we propose to process them with automatic video analysis methods to help detect fraud.

## 2 AUTOMATIC CHEATING RECOGNITION

Given the many advantages of digital assessment, the main problem is to prevent fraud. Ways of hacking of digital examinations has been summarized in [2, 4]. Automatic methods should be able to recognize such cases, either online during the exam, of offline after the exam, in the form of an automatically generated report.

We did preliminary controlled experiments, where screen video recordings of four exams were collected, from two different volunteers. The volunteers introduced controlled instances of unauthorized actions according to a previously established protocol. The log is provided of all the actions of the volunteers.

Initial results look promising. As a first step, we compared the visual similarity of successive frames, akin to the method for shot segmentation [5], to detect changes in screen content, e.g., caused by switching applications. By signaling these changes in the video content, the proctor does not need to watch the whole video anymore. This simple first step reduces the time of proctoring dramatically.

The next step is collecting more video, annotating the fraudulent frames and training machine learning algorithms to further reduce the number of suspicions frames. We will evaluate the speed and accuracy of manually assessing all videos versus using automatic video analysis tools.

## 3 DISCUSSION

In addition to fraud detection, automatic video recognition may offer an analysis of exams: how much time is spent on each question, in which order questions are answered, etc. An open challenge to this approach is how to extend it to less controlled environments such as the student's home.

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