DETECTING POTENTIAL ACADEMIC MISCONDUCT IN CANVAS QUIZZES

Christopher Nitta
Department of Computer Science
University of California, Davis
cjnitta@ucdavis.edu

Talitha van der Meulen
Department of Neurobiology,
Physiology and Behavior
University of California, Davis
tvandermeulen@ucdavis.edu

Marilyn Derby
Office of Student Support and
Judicial Affairs
University of California, Davis
mderby@ucdavis.edu

1. INTRODUCTION

The COVID-19 pandemic left many instructors scrambling to replace traditional paper examinations with online versions. Many opted to use quiz features built into their Learning Management System (LMS). The previously in-person proctored exams, having moved online, left instructors at our institution concerned about academic integrity. Given issues with existing solutions and the capabilities of the Canvas LMS, we developed a software system to detect potential academic misconduct on quizzes.

2. BACKGROUND

Canvas LMS is a widely used open source LMS released under the AGPLv3 (Instructure Inc., 2016). Canvas LMS provides a REST API that allows access to information within the system (Instructure Inc., 2021). A python package, canvasapi, is available to interact with the Canvas REST API (University of Central Florida Center for Distributed Learning, 2017). Using the canvasapi package, we developed a system that is able to detect potential misconduct during quizzes. Our system is further augmented when Canvas' New Analytics Course Activity reports are provided. Further details of the detection system are provided in section 4.

3. RELATED WORK

There are two categories of software that are most related to our work: online proctoring and plagiarism detection. Our system combines the capabilities of both into a single package. Our work also relates to prior work of detecting misconduct in Canvas quizzes.

Online proctoring software solutions such as Respondus Monitor are designed to uphold academic integrity by locking down the web browser, video recording students, and automating the video analysis. Recording students increases exam anxiety, invades student privacy by requiring video monitoring in personal settings and utilizes AI for potential misconduct. The use of such solutions has recently raised ethical questions (Coghlan, 2020); further, students at our institution recently passed a resolution calling for ending their use (REDACTED). Our system differs in that it only utilizes the data provided through Canvas LMS.

Turnitin (Turnitin LLC, 2021) and Measure Of Software Similarity (MOSS) (Aiken, 1997) are well-known for detecting plagiarism in written work and software respectively. Our work differs from that of Turnitin and MOSS as it focuses on Canvas quizzes and looks beyond plagiarism.

The most related work to ours is Coffey and Clarke (Coffey, 2021) which in turn is based upon work by Metzger and Maudoodi (Metzger, 2020). The prior work discusses the use of creating a spreadsheet by pulling the activity logs for each student and was focused on collaboration between students. Our system automates this process, as well as analyzes individual activity.

4. POTENTIAL MISCONDUCT DETECTION SYSTEM

Our misconduct detection system development started in spring 2020 and has resulted in the development of a website that can analyze hundreds of quizzes within minutes or seconds. The system outputs HTML files that have an index sorted by likeliness of misconduct, like results provided by MOSS.

4.1 Potential Individual Misconduct Detection

Our detection system analyzes the individual quiz events for each student. The system detects four main categories of potential misconduct: page blurs, copy and pasting, prior knowledge of questions, and unauthorized resource access. When combined, the individual potential misconduct events can form a summary of concern that our system provides to the instructor for further investigation.

A page blur occurs when the Canvas quiz loses focus which can occur for many reasons. The reasons for a page blur can be as innocent as an accidental click outside the window or as nefarious as opening another window to get the answer.

The Essay Questions on Canvas provide a free-response text box that can have formatting. As the students enter their answers, the current results are transmitted as answer events to Canvas. This allows our system to reconstruct the timeline and detect potential copying and pasting.

Large exam windows accommodate students in different time zones; however, some students used this opportunity to get the questions from classmates and find correct answers before the exam. Our system analyzes the amount of time students take on answering each question and compares it to the rest of the class. For example, an extremely short quiz time coupled with uniform time spent on each question and a high score may indicate prior question knowledge.

A Course Activity report makes it possible for the system to detect unauthorized (Canvas course specific) resource access during the quiz. As the system detects access of Canvas resources, our system can detect the use of multiple devices. To avoid access of resources during the quiz some students will load hundreds of pages of material just seconds before beginning the exam, our system can detect and flag this activity as well.

4.2 Potential Collaborative Misconduct Detection

Our system provides analysis for potential collaborative misconduct beyond the question answer timing discussed previously. When there are large exam windows, the system analyzes quiz time alignment in combination with answer similarity as an indication of potential collaboration. This analysis could not be done manually in a reasonable amount of time.

5. RESULTS

Since deployment of our detection system, it has detected hundreds of confirmed instances of academic misconduct. In just eight courses, 19.2% of the 1,736 students were referred. Instructors have saved immeasurable amounts of time; additionally, the Student Judicial Affairs Officers (SJAO) now routinely have students acknowledge their misconduct on the first meeting because of strong evidence, instead of requiring multiple meetings, or even formal hearings. Reducing the SJAO load is critical; there has been a dramatic increase in misconduct referrals since pandemic began. In total, there were 2.3× as many referrals in the first four terms of the pandemic compared to the preceding four terms (3,246 compared to 1,415).

The data we have indicates that faculty who utilized the system had 1.95× as many referrals related to Canvas quizzes as those who did not, and 3.51× as many per student instructed. The system is likely catching much more misconduct on Canvas quizzes that typically would go undetected without the system. Students referred can be found "Not in Violation" of misconduct for many reasons, such as being adjudicated, or instructor unwilling to pursue a denied secondary or tertiary incident when one has already been confirmed by the student. The rate of students found "Not in Violation" of our system is in line with those referrals that were manually detected.

6. CONCLUSION

The system designed at our institution to detect potential academic misconduct has successfully detected hundreds of cases of academic misconduct. This system or one like it can be deployed at any institution that uses Canvas LMS, and we will provide access to the source repository for those institutions wishing to deploy our system.

REFERENCES

A. Aiken, 1997, "MOSS (Measure Of Software Similarity)", http://theory.stanford.edu/~aiken/moss/

R. Coffey and S. Clarke. 2021. Detecting Student Cooperation on Learning Management System Exams. In ASC 2021: 57th Annual Associated Schools of Construction International Conference, Vol. 2. 339–347. https://easychair.org/publications/paper/8ts4

S. Coghlan, et al., 2020, "Good Proctor or "Big Brother"? AI Ethics and Online Exam Supervision Technologies", arXiv:2011.07647

Instructure Inc., 2016, "Canvas LMS README.md", available online at https://github.com/instructure/canvas-lms

Instructure Inc., 2021, "Canvas LMS – REST API and External Documentation", available only at https://canvas.instructure.com/doc/api/

R. Metzger and R. Maudoodi. [n.d.]. Using Access Reports and API Logs as Additional Tools to Identify Exam Cheating, *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 294-299). Online: Association for the Advancement of Computing in Education (AACE), 2020.

Turnitin, 2021, "Turnitin for Higher Education", available online at https://www.turnitin.com/divisions/higher-education

University of Central Florida Center for Distributed Learning, 2017, "CanvasAPI's documentation", available online at https://canvasapi.readthedocs.io/en/stable/