

An intelligent tool for combatting contract cheating behaviour by facilitating scalable student-tutor discussions

Author:

Renzella, J; Cain, A; Schneider, JG

Publication details:

Proceedings - International Conference on Software Engineering

pp. 298 - 299

9781450371223 (ISBN)

0270-5257 (ISSN)

Event details:

Proceedings of the ACM/IEEE 42nd International Conference on Software Engineering: Companion Proceedings

ELECTR NETWORK

2020-06-27 - 2020-07-19

Publication Date:

2020-06-27

Publisher DOI:

<https://doi.org/10.1145/3377812.3390795>

License:

<https://creativecommons.org/licenses/by-nc-nd/4.0/>

Link to license to see what you are allowed to do with this resource.

Downloaded from http://hdl.handle.net/1959.4/unsworks_76981 in <https://unsworks.unsw.edu.au> on 2024-05-11

An Intelligent Tool for Combatting Contract Cheating Behaviour by Facilitating Scalable Student-Tutor Discussions

Jake Renzella
School of Information Technology
Deakin University, Geelong
Geelong, Victoria
jake.renzella@deakin.edu.au

Andrew Cain
School of Information Technology
Deakin University, Geelong
Geelong, Victoria
andrew.cain@deakin.edu.au

Jean-Guy Schneider
School of Information Technology
Deakin University, Geelong
Geelong, Victoria
jeanguy.schneider@deakin.edu.au

ABSTRACT

With the global increase in demand for online tertiary education, teachers are facing unique challenges in scaling assessment activities and meaningful student engagement. One such aspect is contract cheating behaviours exhibited in the modern online environment — posing a threat to the academic integrity of tertiary education. These obstacles amplify when applied to traditionally difficult domains like introductory programming education. Prior research on contract cheating identification proposes that while challenging, techniques such as developing strong teacher-student relationships, and real-time discussions may lead to instances of identifying contract cheating behaviours. The proposition, then, is to scale real-time, student-teacher discussions with large, online cohorts — similar to those discussions which traditionally took place in the classroom. This poster paper presents Intelligent Discussion Comments (IDCs): A scalable, teacher-asynchronous system which engages students in real-time discussions to extract authentic student understanding. Artificial intelligence services such as voice identification and transcription enrich the discussion process, supporting the teaching team in their decision-making process.

CCS CONCEPTS

• **Applied computing** → **Learning management systems; Distance learning; E-learning**; • **Human-centered computing** → **Human computer interaction (HCI)**.

KEYWORDS

computing education, computing assessment, online education, Learning management system, programming education, human computer interaction, contract cheating detection

ACM Reference Format:

Jake Renzella, Andrew Cain, and Jean-Guy Schneider. 2020. An Intelligent Tool for Combatting Contract Cheating Behaviour by Facilitating Scalable Student-Tutor Discussions. In *42nd International Conference on Software Engineering Companion (ICSE '20 Companion)*, October 5–11, 2020, Seoul, Republic of Korea. ACM, New York, NY, USA, 2 pages. <https://doi.org/10.1145/3377812.3390795>

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

ICSE '20 Companion, October 5–11, 2020, Seoul, Republic of Korea

© 2020 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-7122-3/20/05.

<https://doi.org/10.1145/3377812.3390795>

1 INTRODUCTION

Analysis of global online education trends in a neoteric 2018 paper [4] indicates growth in online enrolments year on year in most regions, including America, Asia and Europe. The Australian Government reports online students enrolments have grown from 21.78% in 2012 to 28.27% in 2018 [6]. This shift in the mode of engagement changes how educators build relationships and interact with students: no longer can teachers rely upon the fact that they will meet their students face-to-face in a weekly tutorial.

Academic integrity broadly refers to two behaviours: *plagiarism*, the act of copying or modifying another's work, and *contract cheating*, paying or facilitating another to develop an original piece of work. Contract cheating is the subject of a smaller body of research compared to plagiarism; however is identified as being a significant issue in most computing units [3]. Techniques for contract cheating detection is limited as cases are not identified by traditional code or text plagiarism detection systems. Student tests and examinations can evaluate student understanding in an invigilated environment, however are difficult to facilitate in large, mixed online and campus cohorts with students from diverse time zones, and examinations may not be able to cover all material presented in a teaching period.

Early work in alternative methods of contract cheating detection indicates that teacher-training and oral assessment techniques like student-teacher discussion can build relationships [1] and identify potential cases where students lack the understanding which would have been required to prepare and submit a particular assignment. These situations may indicate occurrences of contract cheating behaviour which requires closer evaluation by the teaching team [2] however scaling in-person student-tutor discussions is often prohibitive [7].

The Intelligent Discussion Comment system presented in this paper evolved from earlier work which evaluated audio feedback for introductory programming tasks [5]. The study found audio feedback required less time to provide compared to written feedback for programming assignments, was as thorough, and was perceived to impart a greater sense of student-teacher relationship. After introducing asynchronous audio feedback into our large Australian introductory programming unit and validating these benefits, we experienced a phenomenon we have termed "perfect comments". Upon presenting a student with an asynchronous written or audio question to evaluate student understanding; students would respond with high-quality, perfect responses. Further research is required to understand this behaviour; however, we believe some students were accessing the question, researching, and returning to present a high-quality response which did not reflect their actual acquisition of understanding.

2 INTELLIGENT DISCUSSION COMMENTS

To address the perfect comment problem described above, we developed and piloted the intelligent discussion comment system into a large introductory programming unit. The system allows teachers to pre-record audio discussion prompts via an online Learning Management System (LMS). The system then engages the student with a real-time discussion using these prompts. The student's microphone and webcam are engaged throughout the discussion to ensure an authentic response. The response is provided to the teacher asynchronously for later playback. Literature indicates similar systems have not been found in the education domain, however are used in the recruitment industry for large-scale applicant screening.

Figure 1 presents the LMS with the student-response modal open. The modal shows the student listening to a teacher prompt, while the system ensures the microphone is recording their response. The audio is captured automatically from the commencement of the playback to monitor potential abuse. Optionally, video recording of the participant or screen can provide a higher level of invigilation. The system only allows the student one attempt at responding to the prompts, but does allow the student to practice and test the process.

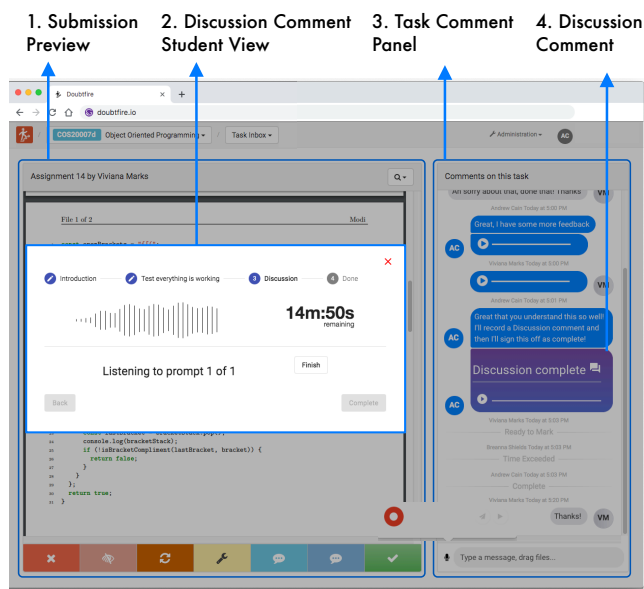


Figure 1: The main user interfaces of the Doubtfire system, with an Intelligent Discussion Comment student response Modal.

Following the creation of a discussion comment by a teacher, a dynamic comment (item 4 in the figure) threads into the task comment panel (item 3). The comment quickly shows the status of the discussion *Not Started*, *Started*, *Complete*, and allows the teacher to playback the response.

Artificial intelligence services such as Microsoft Azure's Voice Identification service and voice transcription can provide further information to the teacher, such as alerting to potential cases where the respondent's voice does not match earlier responses.

3 EVALUATION

We developed the intelligent discussion comment (IDC) system into the Doubtfire open-source LMS, and piloted their use in a large, Australian, mixed campus & online introductory programming unit. Over thirty uses of the IDCs took place in the teaching period. Teachers were trained to provide questions which would garner unique responses. An example of the questions which were often used is: *Can you explain lines 3 to 10 in your code line-by-line?*

Observation and interviews indicated that the tool was useful in developing teacher confidence in student understanding. The synchronicity of the student's response meant that the student has less opportunity to confer or research their response. We also received positive student perceptions to the tool, with students reporting appreciation that their tutor had spent the time recording the prompts. This response is in line with prior research of audio feedback. We did experience some negative responses from students, with one student refusing to complete the discussion, and another case which resulted in intervention.

Some technical and process issues were raised by teaching staff and students, and further work aims to address these concerns before subjecting the tool to further research and development.

4 CONCLUSION

Educators have historically utilised in-classroom, one-to-one discussions to build relationships with students, and develop confidence in a student's understanding and academic integrity. With the global growth in online enrolments in higher education, educators can not rely upon these discussions. Audio communication within the learning management system is a method to help develop relationships with students; however, the asynchronous nature of audio feedback is liable for abuse when used to evaluate student understanding. Intelligent discussion comments is a system to scale synchronous student discussions while remaining asynchronous for the teacher. Our early evaluation has seen increased confidence in teacher's evaluation of student understanding, and in some cases has lead to intervention of student behaviour.

REFERENCES

- [1] Rowena Harper, T Bretag, C Ellis, P Newton, P Rozenberg, S Saddiqui, and K van Haeringen. 2018. Contract cheating: a survey of Australian university staff. *Studies in Higher Education* 1, 1 (April 2018), 1–17. <https://doi.org/10.1080/03075079.2018.1462789>
- [2] Thomas Lancaster and Robert Clarke. 2015. Contract cheating: the outsourcing of assessed student work. *Springer* (2015). https://link.springer.com/content/pdf/10.1007/978-981-287-079-7_17-1.pdf
- [3] Andrew Luxton-Reilly, Simon, Ibrahim Albluwi, Brett A Becker, Michail Giannakos, Amruth N Kumar, Linda Ott, James Paterson, Michael James Scott, Judy Sheard, and Claudia Szabo. 2018. *Introductory programming: a systematic literature review*. ACM. <https://doi.org/10.1145/3293881.3295779>
- [4] Shailendra Palvia, Prageet Aeron, Parul Gupta, Diptiranjana Mahapatra, Ratri Parida, Rebecca Rosner, and Sumita Sindhi. 2018. Online Education: Worldwide Status, Challenges, Trends, and Implications. *Journal of Global Information Technology Management* 21, 4 (Nov. 2018), 233–241. <https://doi.org/10.1080/1097198X.2018.1542262>
- [5] Jake Renzella and Andrew Cain. 2020. Enriching Programming Student Feedback with Audio Comments. In *Proceedings of IEEE/ACM 42nd International Conference on Software Engineering: Software Engineering Education and Training (ICSE-SEET)*. ACM, Seoul, South Korea. to appear.
- [6] UCube. 2019. *uCube - Higher Education Statistics*. Technical Report. <http://highereducationstatistics.education.gov.au/>
- [7] Mary Walker and Cynthia Townley. 2012. Contract cheating: a new challenge for academic honesty? *Journal of Academic Ethics* 10, 1 (Feb. 2012), 27–44. <https://doi.org/10.1007/s10805-012-9150-y>