

Background

Due to the global pandemic, many educational institutions have adapted to online teaching as it is optimal to deliver courses safely. Some universities utilize proctoring software to monitor students' activities during online assessments. However, web cameras and microphones invade students' privacy and introduce unnecessary stress to students. Most importantly, it also fails to emphasize the importance of maintaining academic integrity.

Project Goal

To design a cheating detection system that educates students about academic honesty and detects potential academic misconduct while minimizing the stress introduced.

Design Spec and Objectives

Real-Time Messages	< 6s
Website Classification Speed	< 2s
System Response Time	< 2s
Website Classification Accuracy	90%

Table 1 - Design Specifications
Objectives:

- Provide ethics test
- Detect academic-related websites visited
- Provide real-time warning messages
- Provide real-time analysis results

Challenges

- Collect academic-related website URLs
- Retrieve academic-related websites visited
- Determine website classification methods
- Integrate different system modules

System Overview

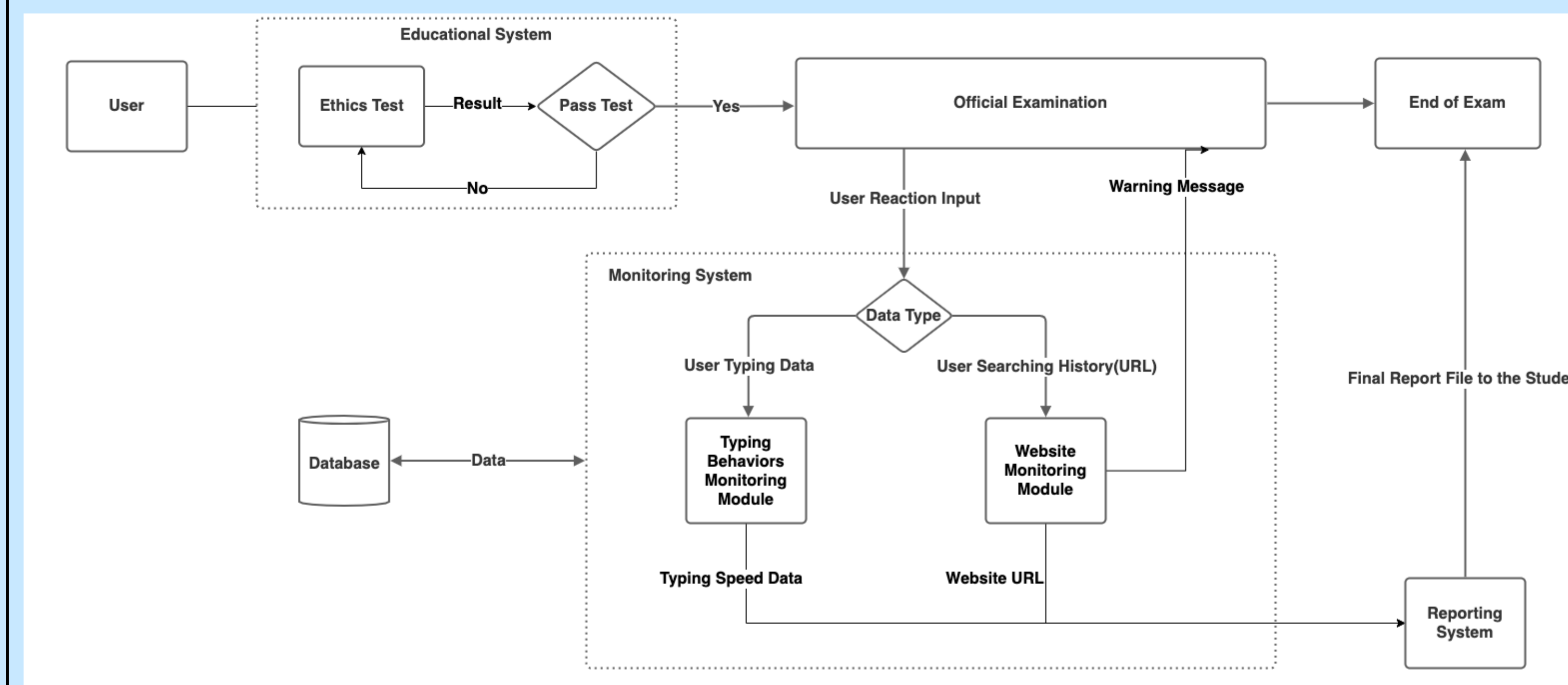


Figure 1 - System Work Flow

Ethics Test Module: Help students recall academic ethics rules and create a warning effect before the assessment

Typing Behaviors Monitoring Module: Analyze the input from students in real-time and capture any suspicious typing actions

Website Monitoring Module: Capture and analyze visited websites with browser extensions and Natural Language Processing (NLP)

- **Website Detection:** Detect and retrieve websites visited during an exam
- **NLP and Text Classification:** Utilize the Naive Bayes Classifier to perform text classification and determine the subject of the website captured

Website Monitoring Module

Website Detection:

The module collects all website URLs users visited using Chrome Extension Library. Then, the extension application sends URL information to the backend with AJAX.

Natural Language Processing:

On the backend, URLs are passed into a pre-trained Naive Bayes Classifier. This classifier calculates each URL's probabilities given each subject and tags the URL using the subject with the greatest probability value.

Risk Level Assignment:

By comparing the subject of the website with that of the ongoing exam, a tag regarding the risk level will be assigned to the URL according to the relevance.

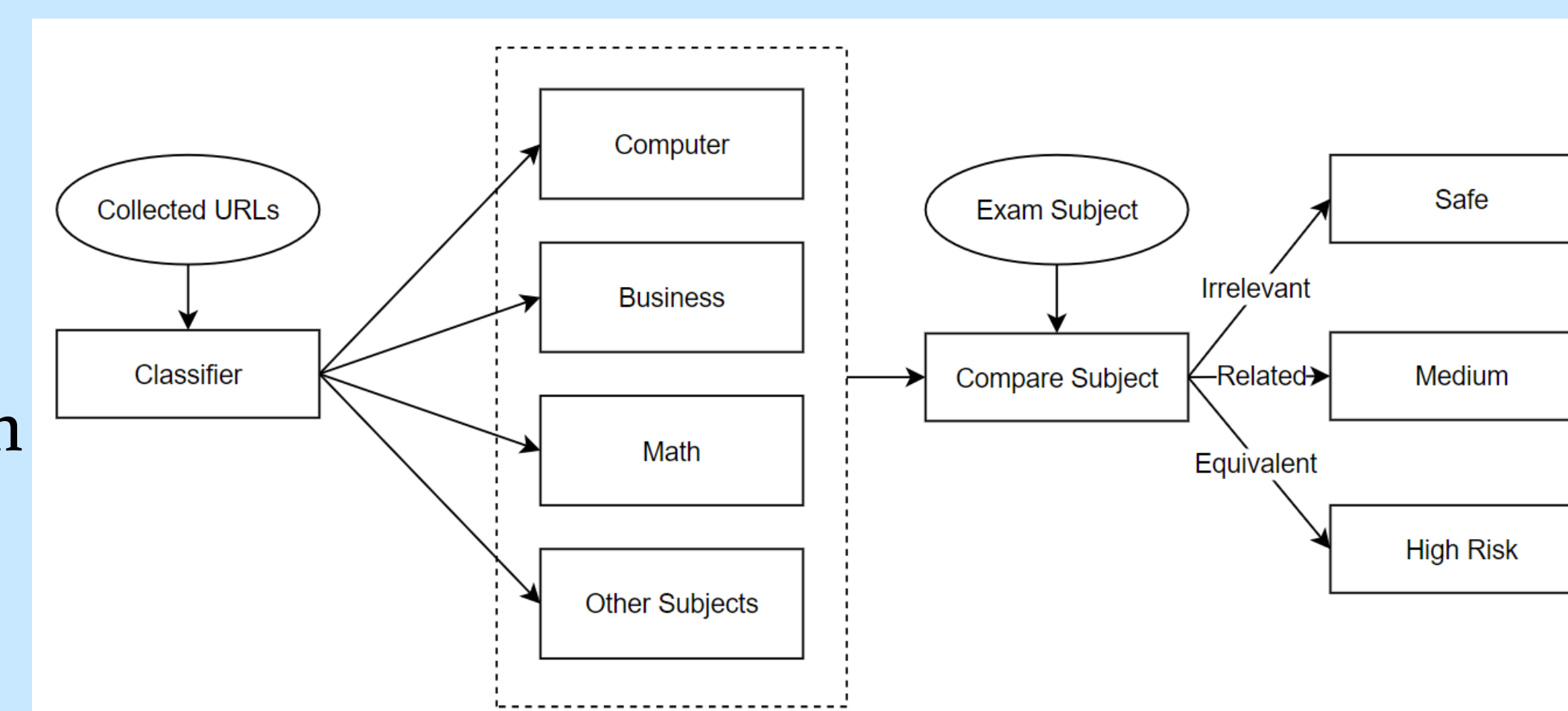


Figure 2 - Website Monitoring Work Flow

Result

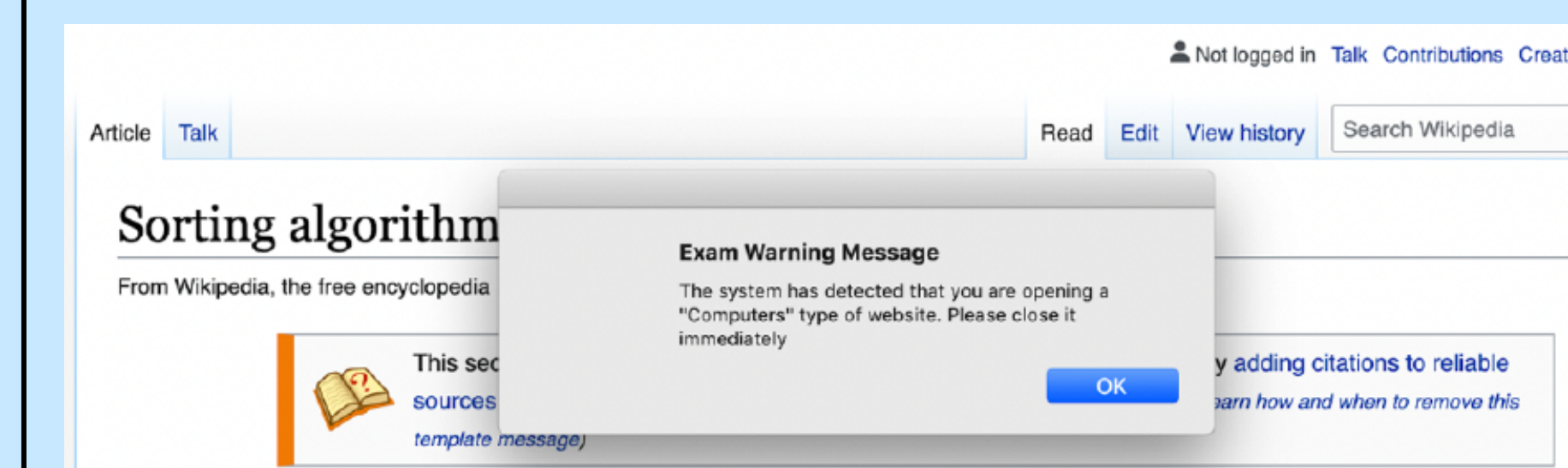


Figure 3 - Real Time Warning Message

Once users access a high risk website, a real time warning message will pop up to stop the cheating behavior.

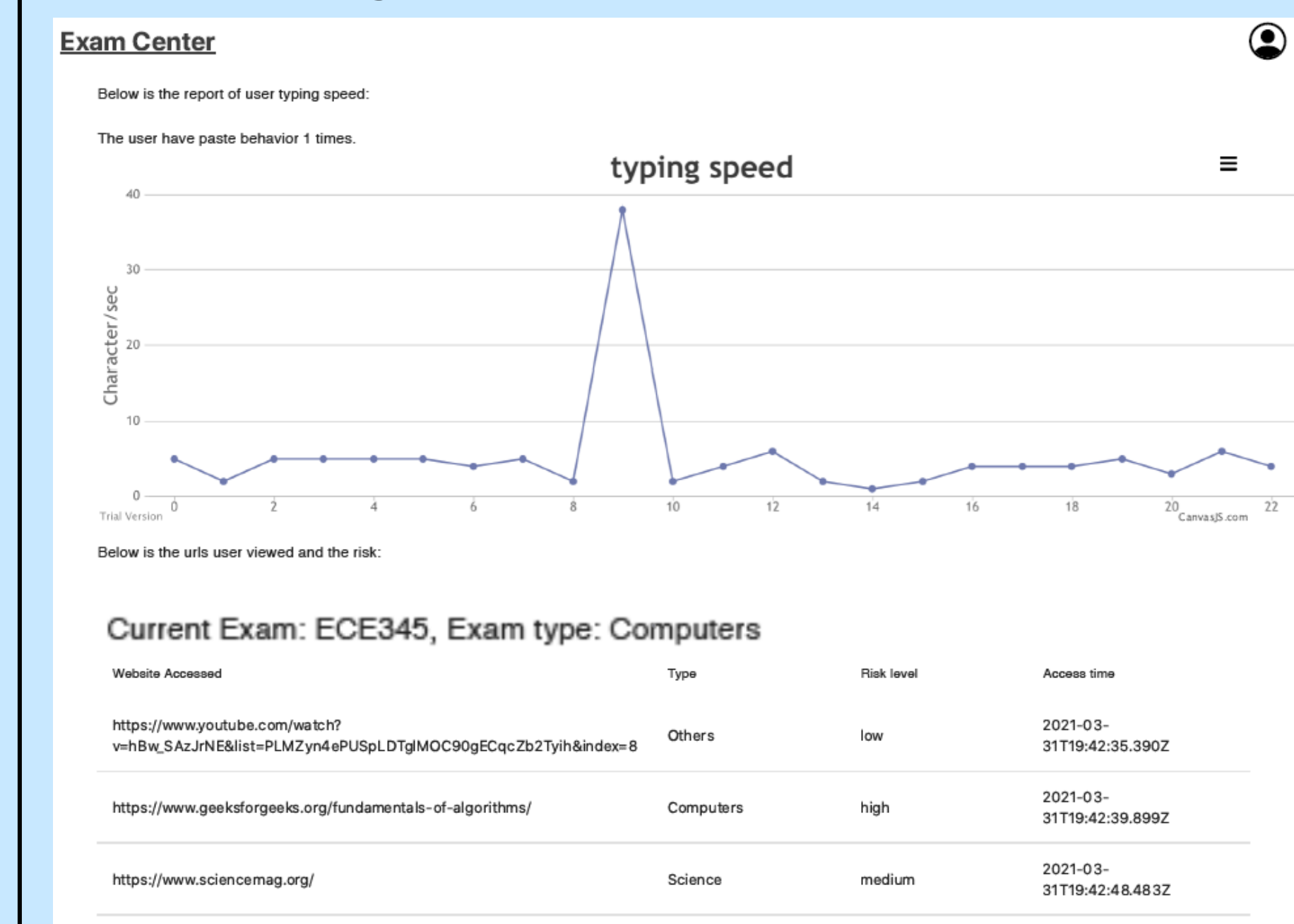


Figure 4 - Report Page

At the end of the exam, a report containing typing behaviors monitoring results and website monitoring results will be generated. Each piece of information is time-stamped for more convenient access by instructors.

Conclusion

We have successfully developed an online exam platform that educates students about academic ethics and monitors cheating behaviors. All the objectives are met and the design achieves a testing accuracy of 90.82% in detecting suspicious websites. We will perform further optimization on the design to improve product reliability.

Acknowledgements

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