

# Knight Foundation School of Computing & Information Sciences

Spring 2022 Senior Design Project

## Automated Grading of Essays

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### PROBLEM

StudyBuddy Pro wants an automated system that can effectively grade and give feedback on short essay questions.

### SYSTEM DESIGN

The AEG System begins with the following input from the StudyBuddy database: the student's answer and the teacher's answer. The backend was made entirely with python and python packages. The texts are analyzed for grammar, then preprocessed for analysis. The teacher answer is made into a rulebook. Topics are extracted from the student essay, so they can be labeled. Then, several functions are used to score/grade the essay based on similarity and other factors. The output is sent to a module that will be displayed to the student on the StudyBuddy website. The frontend code was comprised of HTML, CS, and JavaScript.

### VERIFICATION

- Several weeks were dedicated to having some of the team members research and test avenues for implementations.
- Keyword synonyms, TF/IDF, and other approaches were used to help the accuracy of the similarity and topic extraction portions of the AEG pipeline.

### ACKNOWLEDGEMENT

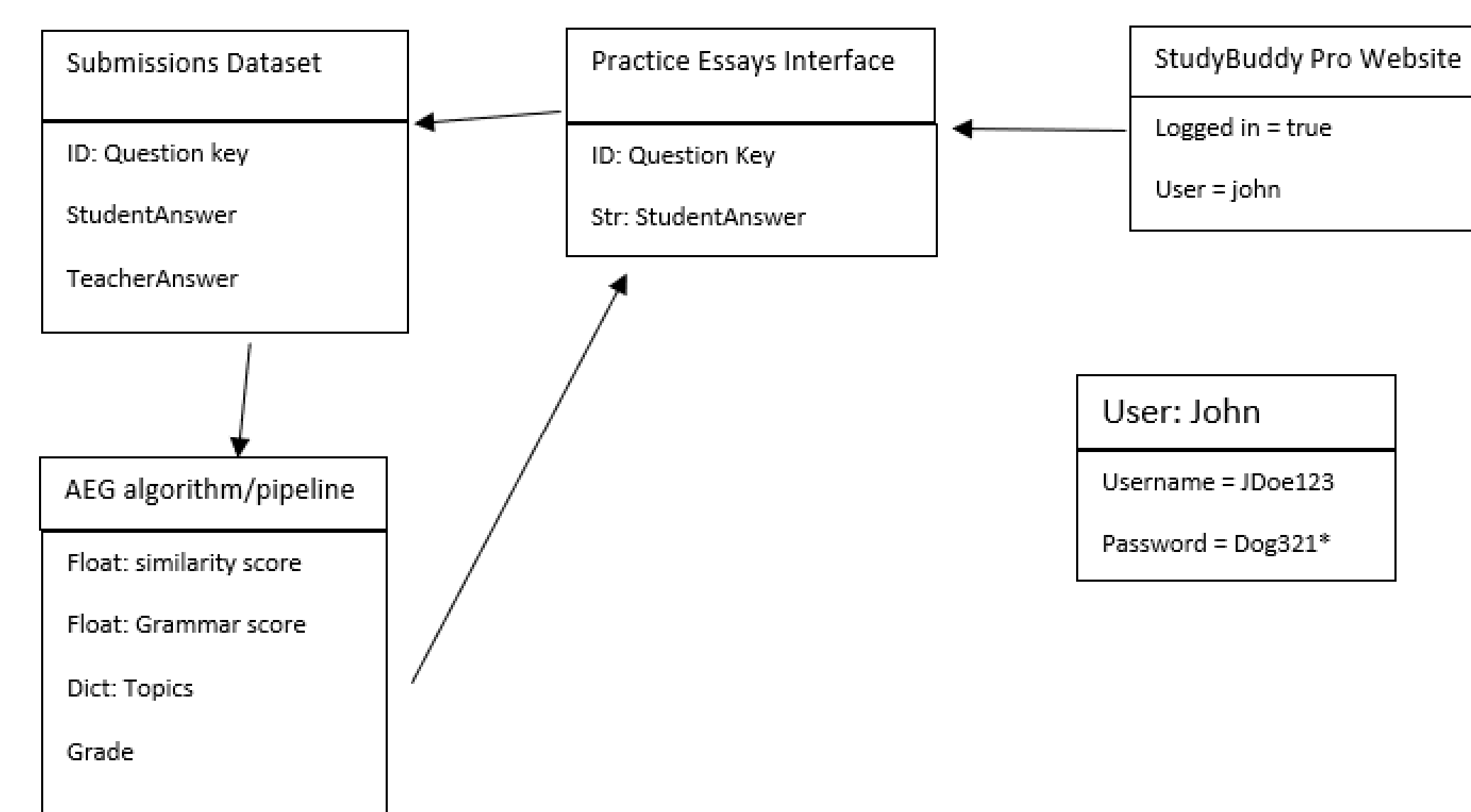
The material presented in this poster is based upon the work supported by Mr. David Gray. We thank David Gray for his assistance and mentorship that I received throughout the senior design project.

### CURRENT SYSTEM

The current system, StudyBuddy Pro, has case briefs, lessons, outlines, refresher courses, issue spotting essays, multiple choice quizzes, exam prep workshops, charts, and notes– all of which are tools to help law students.

### OBJECT DESIGN

Diagram shows how a StudyBuddy Pro user can interact with the software. At the end, a module is sent back to the student, cleanly displaying the findings of the AEG analysis.



### SUMMARY/ MY CONTRIBUTION

My contribution to the project was mainly applied on the backend, both in terms of research and implementation. I helped write and research several topics that became part of the pipeline used to analyze text. My largest contribution to the project was the researching, implementing, and testing of similarity functions that could most accurately identify whether or not the information covered in the student essay answer was aligned with the information provided in the rulebook. I also contributed towards the functions that helped obtain synonyms of keywords, TF/IDF, identifying keywords in the essay, and the labelling the student answer by topic.

### REQUIREMENTS

The system requires a rulebook provided by the teacher for each question. The rulebook is the answer key of an essay question that is used to score and analyze the student answer.

### IMPLEMENTATION



### SCREENSHOT OF THE MODULE

