A Prototype MATLAB Code Critiquer

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ABSTRACT

This poster presents MATLAB Critiquer, a system that examines code submissions and provides feedback to first year engineering students who are learning to program in MATLAB. Code Critiquers act as substitute mentors, when instructors are not available, and give students experience with interactive, test-driven development. [5] Students using our critiquer are engaged in communication by proxy with the instructor. This communication does not replace instructor feedback; rather, it codifies common feedback scenarios to assist the instructor in reaching students just when the student is engaged in problem solving and learning.

Our critiquer uses the MATLAB Java API; connecting to the MATLAB Engine that parses and executes student code submissions. [4] We process error messages that are returned using regular expressions, then use these results to craft feedback for the students. Static code analysis is used to provide feedback on style. The critique covers code structure, shakedown test results, and programming style in a manner appropriate for novice coders.

CCS CONCEPTS

• **Social and professional topics** → Computer science education; Computer engineering education; Student assessment; • **Applied computing** → Interactive learning environments; • **Software and its engineering** → Agile software development.

KEYWORDS

Code Critiquer, Autograder, MATLAB, Engineering Fundamentals

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1 SIGNIFICANCE OF THE TOPIC

Increasingly, students across campus are required to learn some form of programming. Students with little or no programming experience can be easily confused or intimidated, so the feedback they get (both human and automated) must be carefully designed and targeted to novices. We believe that professional grade tools (*e.g.*, development environments, style checkers, unit test frameworks),

designed for experts, provide feedback that is inappropriate and even counterproductive for novices.

Furthermore, not only are non-CS majors learning to program, but many non-CS faculty find themselves teaching programming courses and relying on professional tools to help provide feedback to their students. Besides large-scale initiatives in High Performance Computing, Big Data, and basic Computer Science Research, more and more computation-centric degrees are being offered by universities. Many students in non-computing majors must take programming courses to develop the required computational background for their field. For instance, the MATLAB language for numerical computing is commonly introduced to engineering students of all disciplines.

Through an automated MATLAB Critiquer, we can give engineering students early experience with interactive, test-driven software development. This exposure will prepare them better for today's computer-centric workplace. It will also reduce the frustration that students often experience in early programming projects, mitigating the risk of student burnout and helping with retention in computing-related majors.

2 CONTENT

In this poster we present a code critique for MATLAB. We provide examples of MATLAB code submitted by students and the feedback reported by our MATLAB Critiquer. We discuss the different kinds of feedback provided to students: code structure, shakedown test results, and programming style. A one-page handout will be available that describes our critiquer.

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