Observation and Diagnosis of Novice Java Programmer Skills and Behaviors Using Logged Online Protocols

Significance

The Philippines is a preferred outsourcing venue for computer software and application development including programming and adaptation of system software. As of 2003, the software services sector in the Philippines was a US$350 million industry (Singh, 2003). Investors are drawn to the Philippines because of its high literacy rate, its high English proficiency and government incentives such as tax holidays, deductions on labor expenses, and unrestricted use of consigned equipment (Advincula, 2004). To remain competitive, though, the Philippines needs more skilled software engineers. Computer science educators in the Philippines are therefore under pressure to provide as many prospective graduates with as robust an education as possible.

Worldwide, though, computer science educators are concerned over the rising lack of programming comprehension of first-year computer science students. A study by McCracken, *et. al* (in Wei, Moritz, Parvez, & Blank, 2005) found that approximately 30% of computer science students in the United Kingdom and the United States do not understand programming basics. Novice programmers in the Philippines encounter many of the same difficulties as their foreign counterparts. By developing technologies that help in computer science education, we hope to nurture the skills of our graduates, thereby helping the country maintain its competitive edge.

Project Description

In an earlier PCASTRD-funded study entitled **Modeling Novice Programmers' Behaviors Through Analysis of Logged Online Protocols**, the project proponents developed a programming environment that helps teachers monitor the online protocols and automatically compute summaries and statistics that have a correlation with learning, e.g. error quotients, time between compilations, types of errors, etc. The models that inform these statistics are based on data collected from approximately 250 students in the Ateneo and MSU-IIT during school year 2007-2008. The purpose of this proposed project is to use these tools in three different contexts—Ateneo, MSU-IIT and TIP—in order to validate the models, refine them as necessary, and improve upon the tools.

Objectives

The long-term objective of this course of research is to build an ITS that can diagnose student behavior. At the moment, we already have some tentative models correlating error quotients with achievement and so on. These models were only derived from one semester's data collected from the Ateneo and MSU-IIT. We have also developed a browser and reporting tool that enables teachers to view student online protocols either in real-time or post-hoc.

This phase of the research has several objectives:

- To validate the models derived from the earlier study
- To refine the models, if necessary
- To test the tools developed earlier
- To refine the tools, if necessary.