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Creating and Deploying Automated Software Test Procedures with Regression Testing

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Creating and Deploying Automated Software Test Procedures with Regression Testing

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PROJECT DESCRIPTION

The faculty mentor is the principal author of Knowledge Capture Pro, a software package for creating and analyzing individual's mental models of a process or set of activities. This package was sponsored partially by the Office of the Vice President for Research and Economic Development. It was promoted and featured by the Office of Technology Commercialization. This project served as the basis for a commercial enterprise sponsored by UAH that achieved modest success in the years 2015-2019.

The package is currently available to the public for research purposes. The package has features such as user interface controls, internal algorithms, and network and database support. Like all software, these features must be systematically and thoroughly tested. Several different testing strategies are known. Automated testing involves tests whose input is automatically generated with the output/results automatically verified against the expected output/results. Regression testing involves re-running all tests whenever a change is made, since any change may have an impact on other features not apparently related to the original change. This project will involve developing automated tests that will support full regression testing.

The student will be responsible for organizing, documenting and evaluating tests for this package. The software consists of about 90,000 lines of Java code, with roughly 175 modules (classes) in three subsystems that were written over a period of about ten years. It is freely available for non-commercial or non-sponsored use.

STUDENT DUTIES, CONTRIBUTIONS AND OUTCOMES

Student duties. The student's will first familiarize themselves with the software's basic operation and options. Existing manual test procedures will be performed, at least partially. The student will (with the mentor's guidance) develop a testing architecture to run tests automatically, and prepare two prototype (easy) tests to prove the concept. Then the student will develop successively more interesting tests, based on both the current set of manual tests and the user's guide for the software. A subset of software features will be identified jointly by the mentor and student to be addressed by the tests that are developed. The student will be

responsible for documenting the testing architecture, providing instructions for how to set up the automated tests, how to run them, and how to evaluate the results.

Contributions of the student. The student will be developing practical tests that will be incorporated into the overall testing of the production software package. These will constitute a permanent improvement to its quality that will have an effect over a period of several years as the software undergoes actual use by external researchers and modelers. The student's efforts will thereby contribute directly to its robustness and integrity.

Outcomes for the student. Most computer science students undertake jobs that involve software development and testing. An undergraduate's knowledge is often limited to ad-hoc testing of small programs; this project will give the student experience creating, developing and deploying actual tests for a substantial software package, and evaluating the results of the tests. Participation in this project will give the student practical and in-depth exposure to both the theory and practice of automated testing and regression testing, which are two key approaches used in industry. The long-term benefit for the student goes beyond understanding this particular software package; it will provide him with the background to understand and develop industrial-strength testing procedures in the software development workplace.

STUDENT SELECTION CRITERIA

The student must possess mastery of basic programming and debugging skills, and be competent in the Java programming language at a level comparable to CS 321. The student should be familiar with Java class libraries and know how to incorporate them into their programs. The student should be able to offer evidence of their experience and skills. The student should also have experience with a development IDE, such as Netbeans (preferred), Eclipse or Visual Studio.

FACULTY MENTORSHIP

The mentor is the principal author of the target software and will serve as the primary resource on its development, structure, and functions. The student will be assigned office space near the mentor's office in the Computer Science Department. In keeping with an "agile" approach to this project, the mentor and student will meet daily for a "stand up" meeting to plan each day's activities. There will also be at least two one-hour review conferences/demonstrations with the student per week. Additional contact with the mentor will be available as needed.