Bachelor/Master Thesis Topic

Program Repair via “Naturalness” of Code

Motivation and Background
Bug-fixing generally is a difficult and time-consuming task. Therefore, tools are being developed which help the programmer to find and repair erroneous code or even have the purpose of automatically fixing detected bugs. A recent finding about a certain “naturalness” [1] of correct source code compared to erroneous code points to the examination of techniques that seize on this idea in order to improve current automatic program repair tools. GenProg [2], for example, is a tool for automatically repairing C programs, using a genetic algorithm to generate program patches through simple forms of mutations.

Goals
Examine and explore the possibilities of applying the concept of “naturalness” of code to the algorithms used in GenProg (and possibly other tools like, e.g., PAR [3]) and statistically evaluate the differences in performance.

Description of the Task
The specific tasks are:
- Understand GenProg (and resp. other tools) and find sensible ways for improvement based on the idea of “naturalness” of code depicted above.
- Create the respective implementation(s) based on your findings.
- Perform experimental evaluation and comparison of the original tools and your implementations on a suitable benchmark.

Research Type
Theoretical Aspects: ****
Industrial Relevance: ****
Implementation: ****

Prerequisite
The student should be enrolled in the bachelor/master of software engineering/informatics program, and has completed the required course modules to start a bachelor/master thesis.

Skills required
Programming skills in C/C++ (and possibly Java). Understanding of, or willingness to learn, the software engineering methods and the statistical techniques needed for the project.

References

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Application
Please contact me during my office hours or send me an email with the title: “[ThesisProject]-PRvNoC” to se-career@informatik.hu-berlin.de