Ethan Fast

Mentor: Stephanie Forrest

Mutational robustness describes how likely a variant's phenotype is to remain constant in response to mutations applied within its genotype. This measure has not been evaluated with respect to a genetic programming (GP) approach to automated program repair. We will use a functional definition of phenotype (for each program, a regression test suite) to address several interesting questions. First, the degree of mutational robustness within variants generated by the current repair technique is unknown, and we can quantify this measure. Further, we will investigate whether robustness is a desirable property in the GP program repair context. We hypothesize that baseline generations with greater mutational robustness are more likely to evolve repairs, and moreover, that greater robustness across generations increases the GP algorithm's performance. Finally, we will examine several strategies by which variant robustness can be increased --- changes in variant representation, and pre-selection of robust variants --- and will test the claim that, on average, the use of such strategies shortens the time required to achieve a repair.