

An Automated Approach for Goal-driven, Specification-based Testing

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Abstract: This paper presents a specification-based approach and implementation architecture that addresses several known challenges including false positives and domain knowledge errors. Our approach begins with a system goal graph and functional goal plans. Source code is annotated with goals from plans the program is attempting to achieve; code is then precompiled to emit annotations at run time. Plans are automatically translated into a rule-based recognizer. An oracle is produced from the pre- and post-conditions associated with the plan's goals. When the program is executed, goals and events are emitted and automatically tested against plans and expected results. This allows more efficient testing, including better recognition of false positives - correct results not matching plans - and domain knowledge errors - incorrect results from following intended plans. The concept is demonstrated for a small example and a larger publicly available case study in which we found a mismatch between stated requirements and actual program behavior.