

Dynamic Analysis of Software Systems using Execution Pattern Mining

Hossein Safyallah and Kamran Sartipi
Dept. Computing and Software, McMaster University
Hamilton, ON, L8S 4K1, Canada
{*safyalh, sartipi*}@mcmaster.ca

Abstract

In this paper, we propose a novel technique for dynamic analysis of a software system that is based on the frequent patterns in execution traces of a software system. The patterns represent the common functionality associated with a number of related task scenarios that are executed by the software system. The significance of the approach compared to the existing dynamic analyses lies in the manageable size of the patterns as well as automatic generation of the core system functionality corresponding to the task scenarios. The application of data mining algorithm sequential pattern discovery extracts the common sub-traces of function executions that are shared among a group of related task scenarios. The proposed approach allows us to generate feature specific patterns of execution as well as the common patterns among a number of task scenarios in order to incrementally explore the core functionality associated with a specific task scenario. The proposed approach can be used for program comprehension, feature to scenario assignment, and core functionality extraction of the system components. A case study on the Unix Xfig drawing tool has been provided.