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Analyzing Data Flow Diagrams by Combination of Formal Methods and Visualization Techniques

Haocheng Zhang[a], Wei Liu[a], Hao Xiong[a], Xiaoju Dong[a,*]

[a]*BASICS, Department of Computer Science and Engineering, School of Electronic Information and Electrical Engineering, Shanghai Jiao Tong University*

Abstract

Data flow diagram (DFD) is an indispensable method to model data processing in software engineering. To analyze DFD rigorously, a formal semantics is demanded. Formal interpretation of DFD and its formal semantics lead to an accurate and non-ambiguous analysis. Calculus of Communicating System (CCS), a formal approach in concurrent system modelling, could be utilized to describe DFD. Given its CCS description, automation tools generate the state space of the system depicted by DFD, which reflects all the behaviors of the system. However, analyzing the state space only with character expressions is hard for software developers. In this paper, a visual system is introduced to assist developers to analyze and compare the systems by combination of formal methods and visualization techniques.

Keywords: `Data Flow Diagram`, Calculus of Communicating Systems, State Space, Graph Visualization

1. Introduction

Data flow diagram (DFD), the main design notation of structured analysis, depicts a system as the network of data transformers, which is considered to be a large transformer that inputs from and outputs to outside [1]. It has been widely used in information system design or system analysis in software

*Corresponding author
Email address: `xjdong@sjtu.edu.cn` (Xiaoju Dong)

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