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基于UML的软件Markov链使用模型构造研究

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Abstract
Software statistical testing is concerned with testing software systems based on their usage models. In the context of UML(unified modeling language)-based development, it is desired that the usage models can be derived from the UML analysis artifacts. This paper presents a method that derives the software Markov chain usage models from the reasonably annotated UML artifacts. The method utilizes the annotated use case diagrams, the annotated sequence diagrams, and the use case execution sequence relations. These annotations and the use case execution sequence relations are called statistical testing constraints. The method presents an algorithm that derives the Markov chain usage models from the UML artifacts and the statistical testing constraints. The framework of the support tool, UMGen, is also presented. The usage models can be used to generate software statistical test cases and estimate the software reliability.

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摘要
软件统计测试要求基于软件使用模型产生测试例对软件系统进行测试,并根据测试结果评价软件可靠性,是高可靠软件测试的重要组成部分.由于统一建模语言(unified modeling language,简称UML)已经成为事实上的面向对象标准建模语言,因此,从软件UML模型构造软件使用模型就成为面向对象软件统计测试的关键.为此,定义了加入统计测试约束的UML用例图、序列图以及用例执行顺序关系,为基于UML的软件统计测试提供了一个形式化描述基础.在此基础上,给出一个从软件UML模型构造软件Markov链使用模型的算法,并给出了自动化支持工具UMGen的类图结构,基于一个卫星控制系统,说明了所提出方法的有效性.

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