

Modeling the Evolution of Class Relationships of Object-Oriented Software Systems Networks

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ABSTRACT

Software class relationships networks evolve due to development and maintenance. Studying the changes in the characteristics of these networks helps to understand the design process and the hidden patterns of software development. Our goal in this paper is to model the evolution of the object-oriented software class network by examining network characteristics in the process of software changes (creation and removal of classes). Object-oriented software systems can be presented as directed networks in which the nodes correspond to the classes and edges corresponding to the connections between them (including associative, inheritance, realization and aggregation). Our studies have shown that the software network has small world characteristics and classes' creation and deletion do follow power-law in-degrees and normal out-degrees. The proposed model is evaluated based on the actual data of the EGit open source project (with 13 versions and an average of 720 classes). The results can help developers to predict the process of software development and extract the rules governing software development.

Keywords: Mining Software Code Repository, Network Analysis, Network Evaluation, Class Relationships of Object-Oriented Software Systems Networks.