学 位 論 文 要 旨
Dissertation Summary

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論　文　名：Understanding the Impact of Human Factors on Programming Activity
(Dissertation Title)

The widespread usage of computer systems and its' software components in our social life demands a successful quality management of software development. Since the software development is driven by human programmers, human factors may have large impacts on the software quality. The aim of this study is to empirically examine the important of focusing on human factors in the software quality management. This dissertation focuses on two properties: "comment" and "coding violation" as main parameters to investigate the traits of programmer's habit in programming activities. Both properties are expected to be inter-related and totally dependent on individual programmer's preference. The contributions of this study are: (1) To evaluate the differences in comment densities among individual programmers, and to propose to adjust by using the abnormality of the comment density; The findings show that the proposed metric is a better predictor of change-prone programs. (2) To examine the coding violation trend across all versions of products. The findings show that there is a diversity of important violations among projects and about 12% of disregarded violations are shared among programmers across projects; (3) To examine the influence of authoring types to coding violations. The findings show that the difference in the authoring type has significant impacts on the evaluations of violations: violations appearing in single-authored files may have big gaps with that in multi-authored files, but about 30% of violations would be commonly worthless across projects for many programmers; (4) To investigate which violation is familiar with more programmers and frequently appears in many source files (having a high coverage), and which violation is really related to bugfixes (having a high importance). The findings show that the familiar violations tend to differ among projects, and only 25 violations are common to all surveyed projects, while the trends of their importance vary from project to project. Through the above studies, we empirically proved the importance of focusing on human factors, i.e., the individual differences among programmers for evaluating the software quality. By combining well-defined general guidelines with a mechanism of automatic tuning based on the individual programmer's data, such as "comments" and "coding preferences/habits" we presented, we would obtain a more sophisticated software development environment.