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Santosh Singh Rathore · Sandeep Kumar

Fault Prediction Modeling for the Prediction of Number of Software Faults

Springer

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Preface

Software fault prediction (SFP) can be defined as a process of predicting the fault-proneness of the given software modules using some historic software fault data. For the given software, SFP predicts faulty modules via the use of various software metrics and the fault information collected from the software repositories. The main aim of SFP is to reduce the fault-finding efforts and to increase the quality of the software. To help the software testers and managers, SFP process attempts to provide useful hints by identifying the probable faulty code areas that require extensive testing or refactoring. The typical software fault prediction model is constructed by using some machine learning or statistical techniques and is used to predict software module being faulty on non-faulty. Another way to predict the fault-proneness of the software modules is by predicting number of faults in a module.

In this book, we focus on the prediction of number of faults in the software modules. First, we discuss the generalized process of the software fault prediction and classification of software faults. Next, we discuss various regression techniques and ensemble methods for the prediction of number of faults. Subsequently, we discuss the state-of-the-art literature focusing on the prediction of number of faults. Further, we evaluate different techniques and some ensemble methods for the prediction of number of faults.

This book is organized into six chapters. Chapter 1 introduces the concept of software fault prediction and prediction of the number of faults. The chapter also discusses various classification schemes of software faults and provides information about the contribution and organization of this book. Chapter 2 provides a description of different regression techniques used for the prediction of number of faults. In addition, the chapter also provides a description of the ensemble methods and summarized the state-of-the-art techniques used for the prediction of number of faults in software systems. Chapter 3 presents an experimental analysis of homogeneous ensemble methods for the prediction of number of faults including details of used software fault datasets and categorization of fault datasets into different groups. Chapter 4 presents an experimental study of linear rule-based ensemble

methods for the prediction of number of faults and discusses the results. Chapter 5 presents an experimental study of non-linear rule-based ensemble methods for the prediction of number of faults and discusses the results. Chapter 6 concludes this book.

Gwalior, India — Santosh Singh Rathore
Roorkee, India — Sandeep Kumar

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—Santosh Singh Rathore

I would like to express my sincere thanks to my institute, Indian Institute of Technology Roorkee, India, for providing me a healthy and conducive working environment. I am also thankful to the faculty members of the Department of Computer Science and Engineering, Indian Institute of Technology Roorkee, India, for their constant support and encouragement. I am especially thankful to some of my colleagues, who are more like friends and give me constant support. I am grateful to the editor and the publication team of Springer for their constant cooperation in writing this book. I am really thankful to my wife, sisters, brother, parents-in-law, and my lovely daughter Aastha who is my life for their love and blessings. I have no words to mention the love, blessings, support, patience, and sacrifice of my parents. I dedicate this book to God and to my family.

—Sandeep Kumar

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