

## Uncertainty, Computational Techniques, and Decision Intelligence

Tofiq Allahwiranloo, Narsis A. Kiani, Witold Pedrycz - Series Editors

# Artificial Intelligence Methods for Optimization of the Software Testing Process

Sahar Tahvili and Leo Hatvani

**Artificial Intelligence Methods for Optimization of the Software Testing Process: With Practical Examples and Exercises** presents different artificial intelligence (AI)-based solutions for overcoming the uncertainty found in many initial testing problems. The concept of intelligent decision making is presented as a multi-criterion, multi-objective undertaking. The book provides guidelines on how to manage diverse types of uncertainty with intelligent decision making that can help subject matter experts in industries improve software testing processes. Moreover, this book provides practical Python exercises and industrial case studies that can be used by students and researchers for improving AI and machine learning skills.

### Key Features

- Presents one of the first empirical studies in the field, contrasting theoretical assumptions on innovations in a real industrial environment with a large set of use cases from different testing processes at several large industries in Sweden
- Explores specific comparative methodologies, focusing on developed and developing AI-based solutions
- Serves as a guideline for conducting industrial research in the AI and software testing domains
- Explains all proposed solutions through real industrial case studies

### About the Authors

**Sahar Tahvili, PhD**, is an Operations Team Leader in the Product Development Unit, Cloud RAN, Integration, and Test at Ericsson AB, and also a Researcher at Mälardalen University, Sweden. Tahvili holds a PhD in Software Engineering; her doctoral thesis entitled "Multi-Criteria Optimization of System Integration Testing" was named one of the best new Software Integration Testing books by BookAuthority. She earned her BS and MS degrees in Applied Mathematics with an emphasis on optimization. Tahvili's research focuses on AI, advanced methods for testing complex software-intensive systems, and designing decision support systems (DSS). Previously she worked as a senior researcher at the Research Institutes of Sweden and as a senior data scientist at Ericsson AB.

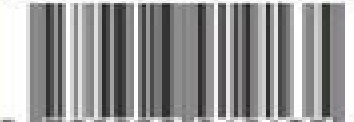
**Leo Hatvani** is a Lecturer at Mälardalen University, Sweden. Leo holds a Licentiate degree in the verification of embedded systems from Mälardalen University. His current research focuses on AI and advanced methods for testing complex software-intensive systems. His teaching is focused on improving Industry 4.0 production processes and product development by integrating AI and augmented and virtual reality. He is working closely with Mälardalen Industrial Technology Centre (MITC), which cooperates with a number of regional companies to introduce Industry 4.0 practices into Swedish industry.



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# Artificial Intelligence Methods In Software Testing

**Michael Seilmaier**



## **Artificial Intelligence Methods In Software Testing:**

*Artificial Intelligence Methods in Software Testing* Horst Bunke, Mark Last, Abraham Kandel, 2004 An inadequate infrastructure for software testing is causing major losses to the world economy The characteristics of software quality problems are quite similar to other tasks successfully tackled by artificial intelligence techniques The aims of this book are to present state of the art applications of artificial intelligence and data mining methods to quality assurance of complex software systems and to encourage further research in this important and challenging area Contents Fuzzy Cause/Effect Models of Software Testing W Pedrycz Black Box Testing with Info Fuzzy Networks M Last Automated GUI Regression Testing Using AI Planning A M Memon Test Set Generation and Reduction with Artificial Neural Networks P Saraph et al Three Group Software Quality Classification Modeling Using an Automated Reasoning Approach T M Khoshgoftaar Data Mining with Resampling in Software Metrics Databases S Dick A Kandel Readership Students researchers and professionals in computer science information systems software testing and data mining

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**Artificial Intelligence Methods for Optimization of the Software Testing Process** Sahar Tahvili, Leo Hatvani, 2022-07-21 Artificial Intelligence Methods for Optimization of the Software Testing Process With Practical Examples and Exercises presents different AI based solutions for overcoming the uncertainty found in many initial testing problems The concept of intelligent decision making is presented as a multi criteria multi objective undertaking The book provides guidelines on how to manage diverse types of uncertainty with intelligent decision making that can help subject matter experts in many industries improve various processes in a more efficient way As the number of required test cases for testing a product can be large in industry more than 10 000 test cases are usually created Executing all these test cases without any particular order can impact the results of the test execution hence this book fills the need for a comprehensive resource on the topics on the how s what s and whys To learn more about Elsevier s Series Uncertainty Computational Techniques and Decision Intelligence please visit this link <https://www.elsevier.com/books-and-journals/book-series/uncertainty-computational-techniques-and-decision-intelligence> Presents one of the first empirical studies in the field contrasting theoretical assumptions on innovations in a real industrial environment with a large set of use cases from developed and developing testing processes at various large industries Explores specific comparative methodologies focusing on developed and developing AI based solutions Serves as a guideline for conducting industrial research in the artificial intelligence and software testing domain Explains all proposed solutions through real industrial case

studies *Artificial Intelligence Methods For Software Engineering* Meir Kalech,Rui Abreu,Mark Last,2021-06-15 Software is an integral part of our lives today Modern software systems are highly complex and often pose new challenges in different aspects of Software Engineering SE Artificial Intelligence AI is a growing field in computer science that has been proven effective in applying and developing AI techniques to address various SE challenges This unique compendium covers applications of state of the art AI techniques to the key areas of SE design development debugging testing etc All the materials presented are up to date This reference text will benefit researchers academics professionals and postgraduate students in AI machine learning and software engineering Related Link s **Machine Learning, ECML- ...** ,2004 *Proceedings of the Sixth International Conference on Software Engineering and Knowledge Engineering* Knowledge Systems Institute,1994-06 **The Directory of Graduate Studies** ,1999 **ACM Transactions on Software Engineering and Methodology** ,1997 Proceedings of the ... International IEEE Conference on Tools for Artificial Intelligence ,1993 **Software Testing Concepts and Practices** K. Mustafa,R. A. Khan,2007 Focusing on software testing in practice this book has been planned to suit the needs of both the practitioner and the academician Concepts of software testing have been modeled as a phase embedded activity rather than treating them as separate and post development activity Each chapter starts with a set of objectives with the prospective of targeting to achieve rather than leaving the student directionless and ends with a list of key terms referring to certain abstract concepts for better and crisp communication alongwith a list of references to enable the user to find in depth information Conference on Artificial Intelligence for Space Applications ,1987 **Third Conference on Artificial Intelligence for Space Applications, Part 1** ,1987 **Third Conference on Artificial Intelligence for Space Applications** ,1987 *11th International Symposium on Software Reliability Engineering* ,2000 Papers from an October 2000 symposium report on recent advances in OO methods modeling testing quantitative methods testability risk assessment measures safety and theory Specific topics include module size distribution and defect density structural testing of Web applications building trust into OO components using a genetic analogy testing polymorphic relationships analyzing testability on data flow designs testing nondeterminate systems modeling fault prone modules of subsystems formal semantics for computational engineering foundations for UML model verification tools and formal limits on determining reliabilities of component based software systems No subject index Annotation copyrighted by Book News Inc Portland OR **Tutorial, Software Testing & Validation Techniques** Edward Miller,1978 Earlier ed published 1977 with title Program testing techniques Which Degree in Britain ,1999 A comprehensive guide to full time degree courses institutions and towns in Britain **General Catalog -- University of California, Santa Cruz** University of California, Santa Cruz,2008 **Optimization of Automated Software Testing Using Meta-Heuristic Techniques** Manju Khari,Deepti Bala Mishra,Biswaranjan Acharya,Ruben Gonzalez Crespo,2022-09-26 This book provides awareness of different evolutionary methods used for automatic generation and

optimization of test data in the field of software testing While the book highlights on the foundations of software testing techniques it also focuses on contemporary topics for research and development This book covers the automated process of testing in different levels like unit level integration level performance level evaluation of testing strategies testing in security level optimizing test cases using various algorithms and controlling and monitoring the testing process etc This book aids young researchers in the field of optimization of automated software testing provides academics with knowledge on the emerging field of AI in software development and supports universities research centers and industries in new projects using AI in software testing Supports the advancement in the artificial intelligence used in software development Advances knowledge on artificial intelligence based metaheuristic approach in software testing Encourages innovation in traditional software testing field using recent artificial intelligence

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