

## 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.

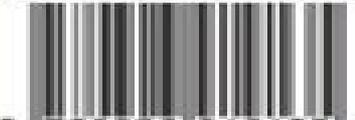
**Leo Hatvani** is a Lecturer at Mälardalen University, Sweden. Leo holds a Licentiate degree in the verification of embedded systems from Mälardalen University. His current research focuses on AI and advanced methods for testing complex software-intensive systems. His teaching is focused on improving 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

**Sahar Tahvili, Leo Hatvani**



## **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

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**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 *AI-Driven Software Testing* Srinivasa Rao Bittla,2025-10-21 AI Driven Software Testing explores how Artificial Intelligence AI and Machine Learning ML are revolutionizing quality engineering QE making testing more intelligent efficient and adaptive The book begins by examining the critical role of QE in modern software development and the paradigm shift introduced by AI ML It traces the evolution of software testing from manual approaches to AI powered automation highlighting key innovations that enhance accuracy speed and scalability Readers will gain a deep understanding of quality engineering in the age of AI comparing traditional and AI driven testing methodologies to uncover their advantages and challenges Moving into practical applications the book delves into AI enhanced test planning execution and defect management It explores AI driven test case development intelligent test environments and real time monitoring techniques that streamline the testing lifecycle Additionally it covers AI s impact on continuous integration and delivery CI CD predictive analytics for failure prevention and strategies for scaling AI driven testing across cloud platforms Finally it looks ahead to the future of AI in software testing discussing emerging trends ethical considerations and the evolving role of QE professionals in an AI first world With real world case studies and actionable insights AI Driven Software Testing is an essential guide for QE engineers developers and tech leaders looking to harness AI for smarter faster and more reliable software testing What you will learn What are the key principles of AI ML driven quality engineering What is intelligent test case generation and adaptive test automation Explore predictive analytics for defect prevention and risk assessment Understand integration of AI ML tools in CI CD pipelines Who this book is for Quality Engineers looking to enhance software testing with AI driven techniques Data Scientists exploring AI applications in software quality assurance and engineering Software Developers Engineers seeking to integrate AI ML into testing and automation workflows

**Machine Learning, ECML- ...** ,2004 **Proceedings of the Sixth International Conference on Software Engineering and Knowledge Engineering** Knowledge Systems Institute,1994-06 *ACM Transactions on Software Engineering and Methodology* ,1997 **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

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**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 **The Directory of Graduate Studies** ,1999 Proceedings of the 1988 American Control Conference ,1988 **Software Testing Techniques** Boris Beizer,1990 Addresses the idea that design of testability is as important as testing itself not just by saying that testability is a desirable goal but by showing the reader how to do it **Conference on Artificial Intelligence for Space Applications** ,1987 **Proceedings of the ...**

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**Third Conference on Artificial Intelligence for Space Applications** ,1987 **Fifth Conference on Artificial Intelligence for Space Applications** ,1990 *Industrial Software Technology* Institution of Electrical Engineers,1987 This book brings together twenty one papers on developments in software technology selected from papers presented at recent European Seminars on Industrial Software Technology organised by the European Workshop on Industrial Computer Systems EWICS

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