

# Preface

Learning classifier systems are a machine learning paradigm introduced by John Holland in 1976. They are rule-based systems in which learning is viewed as a process of ongoing adaptation to a partially unknown environment through genetic algorithms and temporal difference learning.

From the beginning, classifier systems have attracted the interest of researchers in many different areas, ranging from the design of gas pipelines to personal internet agents, and including cognitive science, data mining, economic trading agents, and autonomous robotics. In 1989 Stewart Wilson and David Goldberg presented a review of the first decade of classifier system research, discussing some of the milestones that characterized the field's early development. In 1992 the First International Workshop on Learning Classifier Systems (IWLCS92) was held in Houston, Texas.

The 1990s saw an increasing interest in the field: many successful applications to real-world problems were presented as well as new classifier system models. With seven years since the first workshop and more than 400 papers published, it was time in 1999 to examine again the state of the art of learning classifier system research. For this purpose the Second International Workshop on Learning Classifier Systems (IWLCS99) was organized and the idea of this volume conceived. The workshop, held in Orlando, Florida, July 13, 1999, attracted a vital community of researchers from many different areas who share a common interest in this machine learning paradigm. Some of the most interesting work presented at the workshop appears in this volume.

Our book provides an overview of the current state of the art of learning classifier systems and highlights some of the most promising research directions. The first paper of Part I asks the fundamental question: "What Is a Learning Classifier System?". Answers are given by John Holland, originator of classifier systems, and by other long-time researchers in the field: Lashon Booker, Marco Colombetti, Marco Dorigo, Stephanie Forrest, David Goldberg, Rick Riolo, Robert E. Smith, and Stewart Wilson. Three following papers summarize, from different perspectives, developments in the field since Wilson and Goldberg's 1989 review. Part II contains papers on advanced topics of current interest, including alternative representations, methods for evaluating rule utility, and extensions to existing classifier system models. Part III is dedicated to promising applications of classifier systems such as: data mining, medical data analysis, economic trading agents, aircraft maneuvering, and autonomous robotics. A classifier systems bibliography with more than 400 references completes the book.

We hope that this volume will be a key reference for researchers working with learning classifier systems over the next decade; the constantly increasing interest in this paradigm suggests that there will be many of them!

While we are already looking forward to editing the *sequel* of this book in 2010, we hope to see you in Paris on the 16<sup>th</sup> September 2000, for the Third International Workshop on Learning Classifier Systems (IWLCS 2000).

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# Organization

The idea of this book started during the organization of the Second International Workshop on Learning Classifier Systems (IWLCS99) which was held July 13, 1999 in Orlando (FL) during the Genetic and Evolutionary Computation Conference (GECCO99). Some of the best papers presented during that workshop are in this book.

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