The Fourth International Workshop on Environmental Applications of Machine Learning EAML 2004

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Foreword

The Fourth International Workshop on Environmental Applications of Machine Learning (EAML) and the Fourth European Conference on Ecological Modelling (ECEM) were organized jointly in Bled, Slovenia, during the week of September 27 - October 1, 2004. The aim of these tievents was to bring together researchers from the areas of ecology, ecological modelling and environmental sciences, on one hand, and the areas of data analysis, data mining and machine learning, on the other. In many respects, they were treated as a single event, namely ECEM/EAML 2004.

Ecological modelling is concerned with the development and use of mathematical, computer and simulation models of ecosystems. It is a relatively young scientific discipline, which is rapidly gaining importance, especially because of the use and usefulness of ecological models for the management of natural resources. The European Conference on Ecological Modelling is the premiere European scientific event in the area of ecological modelling and regularly attracts an international audience.

As environmental concerns grow and information technology develops, more and more data on the different aspects (physical, chemical, biological, ecological) of the environment are gathered. There is an increasing need to analyse the collected environmental data for different purposes, which include the support for environmental management decisions. The International Workshop on Environmental Applications of Machine Learning provided a forum for presenting recent advances in applying machine learning and data mining techniques for the analysis of environmental data.

EAML 2004 covered all topics related to the application of data mining and machine learning methods to environmental data. An indicative, but non-exhaustive list of topics is given below:

- Analysis of environmental data with:
  - computational scientific discovery;
  - decision and regression tress;
  - evolutionary computing, e.g., genetic algorithms and programming;
  - statistical learning, e.g., kernel methods and SVMs;
  - neural networks, e.g., MLPs and SOMs;
  - probabilistic methods, e.g., Bayesian networks;
  - relational learning methods;
  - rule induction methods.

- Data mining and machine learning for:
  - modelling of different types of ecosystems, e.g., agricultural ecosystems, aquatic ecosystems, grassland ecosystems, forest ecosystems;
  - modelling different aspects of ecosystems/ecological processes, e.g., biodiversity changes, habitat suitability, population dynamics;
  - analysis of different types of environmental data, e.g., monitoring data (air/soil/water samples; chemical, physical, biological), remote sensing data (e.g., on atmosphere, geology, vegetation), spatial data (e.g., GIS data on land cover), temporal data (e.g., time series data on pollution levels);
  - various environmental applications of machine learning, e.g., for decision support in environmental management, for earthquake prediction, for environmental risk assessment, in environmental epidemiology, in meteorological/atmospheric sciences, in predictive ecotoxicology.

A total of 110 abstracts were submitted and 90 were accepted after a review process. Each submitted abstract was sent to three members of the Program Committee for review. The Program Committee members themselves did the majority of reviews, assisted by a few additional reviewers appointed by the Committee members. Authors of accepted abstracts (for oral or poster presentation) were invited to submit full versions of their papers. These were reviewed separately by the members of the Program Committee and other reviewers for inclusion in a special issue of the journal Ecological Modelling which was to be published after the conference.

The program of EAML 2004 consisted of three invited talks by Joseph C. Coughlan (NASA Ames, USA), Cesare Furlanello (ITC-irst, Trento, Italy), and Jacqueline McGlade (European Environment Agency), as well as oral and poster presentations of accepted contributions.

Many people contributed in various ways to the EAML 2004 workshop. We would especially like to thank:

- The authors of submitted contributions who made the workshop possible by presenting their work;
- The three invited speakers: Joseph C. Coughlan, Cesare Furlanello, and Jacqueline McGlade;
- The Advisory Committee for their suggestions regarding the Program Committee, invited speakers and encouraging remarks;
- The members of the Program Committee for their efforts in evaluating the submitted abstracts and papers;
- The members of the Organizing Committee;
- The sponsors for their generous support;

- The management and staff of the Albatros Congress Turist Agency, Bled, and the Center for Knowledge Transfer in Information Technologies, Jožef Stefan Institute, Ljubljana for their support;

- The Jožef Stefan Institute for providing the organizational infrastructure.

Sašo Džeroski, Bernard Ženko and Marko Debeljak
EAML 2004 Program Co-chairs

Contents

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