

Intelligent Data Analysis in Medicine and Pharmacology, and Knowledge-Based Information Management in Anaesthesia and Intensive Care 2003

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Abstract

The joint workshop *Intelligent Data Analysis in Medicine and Pharmacology, and Knowledge-Based Information Management in Anaesthesia and Intensive Care 2003* takes place during AIME'03. AIME'03 is the Ninth European Conference on Artificial Intelligence in Medicine Europe 2003, which is held between 19 and 22 October 2003, in Cyprus. The workshop brings together the two successful and related workshop series on Intelligent Data Analysis In Medicine And Pharmacology (IDAMAP) and Knowledge-Based Information Management in Anaesthesia and Intensive Care (KBIM-AIC) which have been run separately up till now. The scope of the joint workshop is the union of the scopes of its two component workshops in the hope that a fruitful exchange of ideas will take place. The workshop includes the following types of presentations: Invited, long, short, and poster presentations. The contributions to this workshop can be clustered into the following categories: Machine Learning; Temporal Reasoning; Visualization; Intensive Care and Anaesthesia; and Fundamental (Statistical) Issues.

1 Introduction

The IDAMAP and the KBIM-AIC workshop series are brought together in this workshop because of the overlap in their methodological scope and in the hope that a fruitful exchange of ideas will take place

The IDAMAP workshop series is devoted to computational methods for data analysis in medicine, biology and pharmacology that somehow exploit expert knowledge of the problem domain. Such knowledge may be available at different stages of the data analysis and model-building process. Nowadays, machine-learning tools provide a promising means to derive understandable diagnostic and prognostic rules. Bayesian structure and parameter learning methods are capable of capturing the (in)dependence struc-

ture hidden in data and of learning and updating the model's parameters. Clustering and instance-based learning methods, like case-based reasoning, may represent a crucial help to physicians in their decision making process. The interpretation of time-ordered data through the derivation and revision of temporal trends and other types of temporal data abstraction provides a powerful instrument for event detection and prognosis. Finally, data visualization is increasingly becoming an essential element in the overall process of knowledge discovery in databases.

The KBIM-AIC workshop series focuses on the increasingly complex care of critically ill patients in Intensive Care Units (ICUs) and during Anaesthesia. Clinicians are required rapidly to interpret and respond to a large number of clinical parameters, selecting appropriate treatment for the patient among many different options. New measurement technologies have increased the demand for improved information management, as has the need to monitor and assess the quality of care provided. The introduction of intelligent knowledge-based techniques is seen as one way of assisting clinicians with this information overload. These techniques include: computational methods for intelligent data analysis; quality control and assessment; clinical guidelines; intelligent monitoring; decision support; physiological modeling; planning and scheduling; uncertain and temporal reasoning; and information visualization.

2 Papers

The workshop represents a wide spectrum of work on methodological issues of intelligent data analysis pertaining to the themes of the joint workshop and on specific applications in medicine and pharmacology. The invited talk *Data analysis and knowledge validation in intensive care monitoring* by Katharina Morik, shows the impact of the combination of knowledge-based reasoning and data-driven prediction and validation on evidence-based medicine and decision support, exemplified in intensive care. This is an excellent example of research at the overlap between elements of the two workshop series, IDAMAP and KBIM-AIC. The other workshop papers can be clustered in the fol-

lowing categories: Machine Learning; Temporal Reasoning; Visualization; Intensive Care and Anaesthesia; and Fundamental (Statistical) Issues.

The Machine Learning (ML) cluster includes papers covering various application domains: histopathology, gene-expression, pharmacology, and clinical medicine. Approaches include supervised and non-supervised techniques: rule-induction and decision trees; Bayesian methods; self-organizing maps for clustering; and support vector machines for classification.

The papers in the Temporal Reasoning cluster deal with: a language for temporal-abstractions (TA); an approach for intelligent TA; an application of intelligent TA in gene expressions data; medical scenario construction; and simulation.

Papers in the Visualization cluster deal with dynamic modeling of gene expressing data; and interactive visualization of time-oriented clinical data. In this cluster the time aspect is also visible.

Papers in the Intensive Care and Anaesthesia cluster deal with: Creating an information infra-structure for neonatal intensive care; intelligent patient monitoring; and guidelines for artificial ventilation of newborn infants.

Finally, in the Fundamental Statistical Issues cluster, papers deal with the dichotomization of survival variables in medical prognosis; and statistical methods to compare different definitions of diseases.

We hope that the selection of papers in these working notes provides the reader with a valuable insight into current work in the fields of intelligent data analysis in medicine and pharmacology and in knowledge-based information management in anaesthesia and intensive care.

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