

Educational Data Mining: a Case Study

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Abstract. In this paper, we show how using data mining algorithms can help discovering pedagogically relevant knowledge contained in databases obtained from Web-based educational systems. These findings can be used both to help teachers with managing their class, understand their students' learning and reflect on their teaching and to support learner reflection and provide proactive feedback to learners.

1 Introduction

Web-based educational systems collect large amounts of student data, from web logs to much more semantically rich data contained in student models. Whilst a large focus of AIED research is to provide adaptation to a learner using the data stored in his/her student model, we explore ways to mining data in a more collective way: just as a human teacher can adapt to an individual student, the same teacher can also learn more about how students learn, reflect and improve his/her practice by studying a group of students.

The field of Data Mining is concerned with finding new patterns in large amounts of data. Widely used in Business, it has scarce applications to Education. Of course, Data Mining can be applied to the business of education, for example to find out which alumni are likely to make larger donations. Here we are interested in mining student models in a pedagogical perspective. The goal of our project is to define how to make data possible to mine, to identify which data mining techniques are useful and understand how to discover and present patterns that are pedagogically interesting both for learners and teachers.

The process of tracking and mining such student data in order to enhance teaching and learning is relatively recent but there are already a number of studies trying to do so and researchers are starting to merge their ideas [1]. The usefulness of mining such data is promising but still needs to be proven and stereotypical analysis to be streamlined. Some researchers already try and set up some guidelines for ensuring that ITS data can be usefully minable [2] out of their experience of mining data in the project LISTEN [3].

Some directions start to emerge. Simple statistics, queries or visualisation algorithms are useful to give to teachers/tutors an overall view of how a class is doing. For example, the authors in [4] use pedagogical scenarios to control interactive learning objects. Records are used to build charts that show exactly where each student is in the learning sequence, thus offering to the tutor distant monitoring. Similarly in [5], students' answers to exercises are recorded. Simple queries allow to show charts to teachers/tutors of all students with the exercises they have attempted, they have successfully solved, making tutors aware of how students progress through the course. More sophisticated information visualisation techniques are used in [6] to externalise student data and generate pictorial representations for course instructors to explore. Using features extracted from log data and marks obtained in the final exam, some researchers use classification techniques to predict student performance fairly accurately [7]. These allow tutors to identify students at risk and provide advice ahead of the final exam. When student mistakes are recorded, association rules algorithms can be used to find mistakes often associated together [8]. Combined with a genetic algorithm, concepts mastered together can be identified using student scores[9].

Data Mining Case Studies

Markus Hofmann, Andrew Chisholm



Data Mining Case Studies:

Data Mining Case Studies Domingo,2008-06-02 *INTRODUCTION TO DATA MINING WITH CASE STUDIES* GUPTA, G.K.,2014-06-28 The field of data mining provides techniques for automated discovery of valuable information from the accumulated data of computerized operations of enterprises This book offers a clear and comprehensive introduction to both data mining theory and practice It is written primarily as a textbook for the students of computer science management computer applications and information technology The book ensures that the students learn the major data mining techniques even if they do not have a strong mathematical background The techniques include data pre processing association rule mining supervised classification cluster analysis web data mining search engine query mining data warehousing and OLAP To enhance the understanding of the concepts introduced and to show how the techniques described in the book are used in practice each chapter is followed by one or two case studies that have been published in scholarly journals Most case studies deal with real business problems for example marketing e commerce CRM Studying the case studies provides the reader with a greater insight into the data mining techniques The book also provides many examples review questions multiple choice questions chapter end exercises and a good list of references and Web resources especially those which are easy to understand and useful for students A number of class projects have also been included **Data Mining with R** Luis Torgo,2016-11-30 *Data Mining with R Learning with Case Studies* Second Edition uses practical examples to illustrate the power of R and data mining Providing an extensive update to the best selling first edition this new edition is divided into two parts The first part will feature introductory material including a new chapter that provides an introduction to data mining to complement the already existing introduction to R The second part includes case studies and the new edition strongly revises the R code of the case studies making it more up to date with recent packages that have emerged in R The book does not assume any prior knowledge about R Readers who are new to R and data mining should be able to follow the case studies and they are designed to be self contained so the reader can start anywhere in the document The book is accompanied by a set of freely available R source files that can be obtained at the book s web site These files include all the code used in the case studies and they facilitate the do it yourself approach followed in the book Designed for users of data analysis tools as well as researchers and developers the book should be useful for anyone interested in entering the world of R and data mining About the Author Lu s Torgo is an associate professor in the Department of Computer Science at the University of Porto in Portugal He teaches Data Mining in R in the NYU Stern School of Business MS in Business Analytics program An active researcher in machine learning and data mining for more than 20 years Dr Torgo is also a researcher in the Laboratory of Artificial Intelligence and Data Analysis LIAAD of INESC Porto LA *Text Mining and Visualization* Andrew Chisholm,Markus Hoffmann,2016 *R and Data Mining* Yanchang Zhao,2012-12-31 R and Data Mining introduces researchers post graduate students and analysts to data mining using R a free software environment for

statistical computing and graphics The book provides practical methods for using R in applications from academia to industry to extract knowledge from vast amounts of data Readers will find this book a valuable guide to the use of R in tasks such as classification and prediction clustering outlier detection association rules sequence analysis text mining social network analysis sentiment analysis and more Data mining techniques are growing in popularity in a broad range of areas from banking to insurance retail telecom medicine research and government This book focuses on the modeling phase of the data mining process also addressing data exploration and model evaluation With three in depth case studies a quick reference guide bibliography and links to a wealth of online resources R and Data Mining is a valuable practical guide to a powerful method of analysis Presents an introduction into using R for data mining applications covering most popular data mining techniques Provides code examples and data so that readers can easily learn the techniques Features case studies in real world applications to help readers apply the techniques in their work

Text Mining and Analysis Dr. Goutam Chakraborty, Murali Pagolu, Satish Garla, 2014-11-22 Big data It s unstructured it s coming at you fast and there s lots of it In fact the majority of big data is text oriented thanks to the proliferation of online sources such as blogs emails and social media However having big data means little if you can t leverage it with analytics Now you can explore the large volumes of unstructured text data that your organization has collected with Text Mining and Analysis Practical Methods Examples and Case Studies Using SAS This hands on guide to text analytics using SAS provides detailed step by step instructions and explanations on how to mine your text data for valuable insight Through its comprehensive approach you ll learn not just how to analyze your data but how to collect cleanse organize categorize explore and interpret it as well Text Mining and Analysis also features an extensive set of case studies so you can see examples of how the applications work with real world data from a variety of industries Text analytics enables you to gain insights about your customers behaviors and sentiments Leverage your organization s text data and use those insights for making better business decisions with Text Mining and Analysis This book is part of the SAS Press program

High Performance Data Mining in Time Series Yunyue Zhu, 2004 **Text Mining and Analysis** Goutam Chakraborty, Murali Pagolu, Satish Garla, 2013 Big data It s unstructured it s coming at you fast and there s lots of it In fact the majority of big data is text oriented thanks to the proliferation of online sources such as blogs emails and social media However having big data means little if you can t leverage it with analytics Now you can explore the large volumes of unstructured text data that your organization has collected with Text Mining and Analysis Practical Methods Examples and Case Studies Using SAS This hands on guide to text analytics using SAS provides detailed step by step instructions and explanations on how to mine your text data for valuable insight Through its comprehensive approach you ll learn not just how to analyze your data but how to collect cleanse organize categorize explore and interpret it as well Text Mining and Analysis also features an extensive set of case studies so you can see examples of how the applications work with real world data from a variety of industries Text analytics enables you to gain insights about your

customers behaviors and sentiments Leverage your organization s text data and use those insights for making better business decisions with Text Mining and Analysis Data Mining and Medical Knowledge Management: Cases and Applications Berka, Petr,Rauch, Jan,Zighed, Djamel Abdelkader,2009-02-28 The healthcare industry produces a constant flow of data creating a need for deep analysis of databases through data mining tools and techniques resulting in expanded medical research diagnosis and treatment Data Mining and Medical Knowledge Management Cases and Applications presents case studies on applications of various modern data mining methods in several important areas of medicine covering classical data mining methods elaborated approaches related to mining in electroencephalogram and electrocardiogram data and methods related to mining in genetic data A premier resource for those involved in data mining and medical knowledge management this book tackles ethical issues related to cost sensitive learning in medicine and produces theoretical contributions concerning general problems of data information knowledge and ontologies **Applications of Data Management and Analysis** Mohammad Moshirpour,Behrouz H. Far,Reda Alhadj,2018-10-04 This book addresses and examines the impacts of applications and services for data management and analysis such as infrastructure platforms software and business processes on both academia and industry The chapters cover effective approaches in dealing with the inherent complexity and increasing demands of big data management from an applications perspective Various case studies included have been reported by data analysis experts who work closely with their clients in such fields as education banking and telecommunications Understanding how data management has been adapted to these applications will help students instructors and professionals in the field Application areas also include the fields of social network analysis bioinformatics and the oil and gas industries Text Mining, Web Mining, and Visualization Use Cases Using Open Source Tools Markus Hofmann,Andrew Chisholm,2015-12-15 This introductory book for text and web mining utilizes only open source tools to illustrate and teach unique use case applications Each use case consists of a fully implemented application based on a real text web mining example Data and clear instructions to implement the use case are provided in each chapter Readers will investigate at least ten different tools such as R RapidMiner Knime Natural Language Toolkit Open NLP GATE Gephi and ManyEyes to learn text visualization and novel techniques **Data Mining with R** Luis Torgo,2011 The versatile capabilities and large set of add on packages make R an excellent alternative to many existing and often expensive data mining tools Exploring this area from the perspective of a practitioner Data Mining with R Learning with Case Studies uses practical examples to illustrate the power of R and data mining Assuming no prior knowledge of R or data mining statistical techniques the book covers a diverse set of problems that pose different challenges in terms of size type of data goals of analysis and analytical tools To present the main data mining processes and techniques the author takes a hands on approach that utilizes a series of detailed real world case studies Predicting algae blooms Predicting stock market returns Detecting fraudulent transactions Classifying microarray samples With these case studies the author supplies all necessary steps code

and data Web ResourceA supporting website mirrors the do it yourself approach of the text It offers a collection of freely available R source files that encompass all the code used in the case studies The site also provides the data sets from the case studies as well as an R package of several functions *Introduction to Data Mining and Its Applications* S.

Sumathi,S.N. Sivanandam,2006-09-26 This book explores the concepts of data mining and data warehousing a promising and flourishing frontier in data base systems and new data base applications and is also designed to give a broad yet in depth overview of the field of data mining Data mining is a multidisciplinary field drawing work from areas including database technology AI machine learning NN statistics pattern recognition knowledge based systems knowledge acquisition information retrieval high performance computing and data visualization This book is intended for a wide audience of readers who are not necessarily experts in data warehousing and data mining but are interested in receiving a general introduction to these areas and their many practical applications Since data mining technology has become a hot topic not only among academic students but also for decision makers it provides valuable hidden business and scientific intelligence from a large amount of historical data It is also written for technical managers and executives as well as for technologists interested in learning about data mining *Data Mining in Action: Case Studies of Enrollment Management* Jing Luan,Chun-Mei

Zhao,2006-12-15 This volume introduces data mining through case studies of enrollment management Six case studies employed data mining for solving real life issues in enrollment yield retention transfer outs utilization of advanced placement scores and predicting graduation rates among others The authors furnish a tangible sense of data mining at work The volume also demonstrates that data mining bears great potential to enhance institutional research The opening chapter deciphers the similarities and differences between data mining and statistics debunks the myths surrounding both data mining and traditional statistics and points out the intrinsic conflict between statistical inference and the emerging need for individual pattern recognition and resulting customized treatment of students the so called new reality in applied institutional research This is the 131st volume of New Directions for Institutional Research a quarterly journal published by Jossey Bass Click here to see the entire list of titles for New Directions for Institutional Research *Data Mining Techniques in Grid Computing Environments* Werner Dubitzky,2008-10-13

Based around eleven international real life case studies and including contributions from leading experts in the field this groundbreaking book explores the need for the grid enabling of data mining applications and provides a comprehensive study of the technology techniques and management skills necessary to create them This book provides a simultaneous design blueprint user guide and research agenda for current and future developments and will appeal to a broad audience from developers and users of data mining and grid technology to advanced undergraduate and postgraduate students interested in this field **Advances in Databases** Alvaro A.A.

Fernandes,Alasdair J.G. Gray,Khalid Belhajjame,2011-10-29 This book constitutes the thoroughly refereed post conference proceedings of the 28th British National Conference on Databases BNCOD 28 held in Manchester UK in July 2011 The 13

revised full papers 2 short papers 2 demo papers and 1 poster paper presented together with the abstracts of 2 keynote talks and 1 tutorial paper were carefully reviewed and selected from 44 submissions The papers cover a wide range of topics such as XML compression XML updates column oriented stores provenance warehousing streamed data data mashups dataspace sensor network query processing and pattern oriented search

Business Intelligence and Agile Methodologies for Knowledge-Based Organizations: Cross-Disciplinary Applications Rahman El Sheikh, Asim Abdel,Alnoukari, Mouhib,2011-09-30 Business intelligence applications are of vital importance as they help organizations manage develop and communicate intangible assets such as information and knowledge Organizations that have undertaken business intelligence initiatives have benefited from increases in revenue as well as significant cost savings Business Intelligence and Agile Methodologies for Knowledge Based Organizations Cross Disciplinary Applications highlights the marriage between business intelligence and knowledge management through the use of agile methodologies Through its fifteen chapters this book offers perspectives on the integration between process modeling agile methodologies business intelligence knowledge management and strategic management

Data-Driven Reproductive Health Abhishek Sengupta,Priyanka Narad,Gaurav Majumdar,Deepak Modi,2024-10-17 This book provides insight into the transformative impact of data driven approaches on reproductive health Chapters cover a wealth of intricate algorithms of genomic analysis predictive modeling and personalized treatment strategies providing an up to date view of the reproductive healthcare landscape With more than 20 code based examples the book decodes complex biological data using bioinformatics and machine learning and provides valuable insights into fertility genetic disorders and personalized medicine This book is relevant for healthcare professionals researchers and students in the fields of reproductive medicine bioinformatics and genetics

Real-world Data Mining Dursun Delen,2015 As business becomes increasingly complex and global decision makers must act more rapidly and accurately based on the best available evidence Modern data mining and analytics is indispensable for doing this Real World Data Mining demystifies current best practices showing how to use data mining and analytics to uncover hidden patterns and correlations and leverage these to improve all business decision making Drawing on extensive experience as a researcher practitioner and instructor Dr Dursun Delen delivers an optimal balance of concepts techniques and applications Without compromising either simplicity or clarity Delen provides enough technical depth to help readers truly understand how data mining technologies work Coverage includes data mining processes methods and techniques the role and management of data tools and metrics text and web mining sentiment analysis and integration with cutting edge Big Data approaches Throughout Delen s conceptual coverage is complemented with application case studies examples of both successes and failures as well as simple hands on tutorials

Data Mining for Business Analytics Galit Shmueli,Peter C. Bruce,Nitin R. Patel,2016-04-22 An applied approach to data mining and predictive analytics with clear exposition hands on exercises and real life case studies Readers will work with all of the standard data mining methods using the Microsoft Office Excel add in

XLMiner to develop predictive models and learn how to obtain business value from Big Data Featuring updated topical coverage on text mining social network analysis collaborative filtering ensemble methods uplift modeling and more the Third Edition also includes Real world examples to build a theoretical and practical understanding of key data mining methods End of chapter exercises that help readers better understand the presented material Data rich case studies to illustrate various applications of data mining techniques Completely new chapters on social network analysis and text mining A companion site with additional data sets instructors material that include solutions to exercises and case studies and Microsoft PowerPoint slides <https://www.dataminingbook.com> Free 140 day license to use XLMiner for Education software Data Mining for Business Analytics Concepts Techniques and Applications in XLMiner Third Edition is an ideal textbook for upper undergraduate and graduate level courses as well as professional programs on data mining predictive modeling and Big Data analytics The new edition is also a unique reference for analysts researchers and practitioners working with predictive analytics in the fields of business finance marketing computer science and information technology Praise for the Second Edition full of vivid and thought provoking anecdotes needs to be read by anyone with a serious interest in research and marketing Research Magazine Shmueli et al have done a wonderful job in presenting the field of data mining a welcome addition to the literature ComputingReviews.com Excellent choice for business analysts The book is a perfect fit for its intended audience Keith McCormick Consultant and Author of SPSS Statistics For Dummies Third Edition and SPSS Statistics for Data Analysis and Visualization Galit Shmueli PhD is Distinguished Professor at National Tsing Hua University's Institute of Service Science She has designed and instructed data mining courses since 2004 at University of Maryland Statistics.com The Indian School of Business and National Tsing Hua University Taiwan Professor Shmueli is known for her research and teaching in business analytics with a focus on statistical and data mining methods in information systems and healthcare She has authored over 70 journal articles books textbooks and book chapters Peter C Bruce is President and Founder of the Institute for Statistics Education at www.statistics.com He has written multiple journal articles and is the developer of Resampling Stats software He is the author of Introductory Statistics and Analytics A Resampling Perspective also published by Wiley Nitin R Patel PhD is Chairman and cofounder of Cytel Inc based in Cambridge Massachusetts A Fellow of the American Statistical Association Dr Patel has also served as a Visiting Professor at the Massachusetts Institute of Technology and at Harvard University He is a Fellow of the Computer Society of India and was a professor at the Indian Institute of Management Ahmedabad for 15 years

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