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**51**

# **SOFT COMPUTING AND INTELLIGENT DATA ANALYSIS IN OIL EXPLORATION**

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# Soft Computing And Intelligent Data Analysis In Oil Exploration

**Robert V. Demicco, George J. Klir**



## **Soft Computing And Intelligent Data Analysis In Oil Exploration:**

**Soft Computing and Intelligent Data Analysis in Oil Exploration** M. Nikravesh, L.A. Zadeh, Fred Aminzadeh, 2003-04-22 This comprehensive book highlights soft computing and geostatistics applications in hydrocarbon exploration and production combining practical and theoretical aspects It spans a wide spectrum of applications in the oil industry crossing many discipline boundaries such as geophysics geology petrophysics and reservoir engineering It is complemented by several tutorial chapters on fuzzy logic neural networks and genetic algorithms and geostatistics to introduce these concepts to the uninitiated The application areas include prediction of reservoir properties porosity sand thickness lithology fluid seismic processing seismic and bio stratigraphy time lapse seismic and core analysis There is a good balance between introducing soft computing and geostatistics methodologies that are not routinely used in the petroleum industry and various applications areas The book can be used by many practitioners such as processing geophysicists seismic interpreters geologists reservoir engineers petrophysicist geostatisticians asset managers and technology application professionals It will also be of interest to academics to assess the importance of and contribute to R D efforts in relevant areas

**Artificial Intelligence and Data Analytics for Energy Exploration and Production** Fred Aminzadeh, Cenk Temizel, Yasin Hajizadeh, 2022-08-26 ARTIFICIAL INTELLIGENCE AND DATA ANALYTICS FOR ENERGY EXPLORATION AND PRODUCTION This groundbreaking new book is written by some of the foremost authorities on the application of data science and artificial intelligence techniques in exploration and production in the energy industry covering the most comprehensive and updated new processes concepts and practical applications in the field The book provides an in depth treatment of the foundations of Artificial Intelligence AI Machine Learning and Data Analytics DA It also includes many of AI DA applications in oil and gas reservoirs exploration development and production The book covers the basic technical details on many tools used in smart oil fields This includes topics such as pattern recognition neural networks fuzzy logic evolutionary computing expert systems artificial intelligence machine learning human computer interface natural language processing data analytics and next generation visualization While theoretical details will be kept to the minimum these topics are introduced from oil and gas applications viewpoints In this volume many case histories from the recent applications of intelligent data to a number of different oil and gas problems are highlighted The applications cover a wide spectrum of practical problems from exploration to drilling and field development to production optimization artificial lift and secondary recovery Also the authors demonstrate the effectiveness of intelligent data analysis methods in dealing with many oil and gas problems requiring combining machine and human intelligence as well as dealing with linguistic and imprecise data and rules

**Recent Developments and New Direction in Soft-Computing Foundations and Applications** Lotfi A. Zadeh, Ali M. Abbasov, Ronald R. Yager, Shahnaz N. Shahbazova, Marek Z. Reformat, 2016-05-25 This book reports on advanced theories and cutting edge applications in the field of soft computing The individual chapters written by leading

researchers are based on contributions presented during the 4th World Conference on Soft Computing held May 25 27 2014 in Berkeley The book covers a wealth of key topics in soft computing focusing on both fundamental aspects and applications The former include fuzzy mathematics type 2 fuzzy sets evolutionary based optimization aggregation and neural networks while the latter include soft computing in data analysis image processing decision making classification series prediction economics control and modeling By providing readers with a timely authoritative view on the field and by discussing thought provoking developments and challenges the book will foster new research directions in the diverse areas of soft computing

Fuzzy Logic in Geology Robert V. Demicco, George J. Klir, 2003-10-20 What is fuzzy logic a system of concepts and methods for exploring modes of reasoning that are approximate rather than exact While the engineering community has appreciated the advances in understanding using fuzzy logic for quite some time fuzzy logic's impact in non engineering disciplines is only now being recognized The authors of Fuzzy Logic in Geology attend to this growing interest in the subject and introduce the use of fuzzy set theory in a style geoscientists can understand This is followed by individual chapters on topics relevant to earth scientists sediment modeling fracture detection reservoir characterization clustering in geophysical data analysis ground water movement and time series analysis George Klir is the Distinguished Professor of Systems Science and Director of the Center for Intelligent Systems Fellow of the IEEE and IFSA editor of nine volumes editorial board member of 18 journals and author or co author of 16 books Foreword by the inventor of fuzzy logic Professor Lotfi Zadeh

*Applications of Artificial Intelligence Techniques in the Petroleum Industry* Abdolhossein Hemmati-Sarapardeh, Aydin Larestani, Nait Amar Menad, Sassan Hajirezaie, 2020-08-26 Applications of Artificial Intelligence Techniques in the Petroleum Industry gives engineers a critical resource to help them understand the machine learning that will solve specific engineering challenges The reference begins with fundamentals covering preprocessing of data types of intelligent models and training and optimization algorithms The book moves on to methodically address artificial intelligence technology and applications by the upstream sector covering exploration drilling reservoir and production engineering Final sections cover current gaps and future challenges Teaches how to apply machine learning algorithms that work best in exploration drilling reservoir or production engineering Helps readers increase their existing knowledge on intelligent data modeling machine learning and artificial intelligence with foundational chapters covering the preprocessing of data and training on algorithms Provides tactics on how to cover complex projects such as shale gas tight oils and other types of unconventional reservoirs with more advanced model input

**New Directions in Intelligent Interactive Multimedia** George A Tsihrintzis, Maria Virvou, 2008-09-09 This book summarizes the works and new research results presented at the First International Symposium on Intelligent Interactive Multimedia Systems and Services KES IIMSS 2008 organized by the University of Piraeus and its Department of Informatics in conjunction with KES International Piraeus Greece July 9 11 2008 The aim of the symposium was to provide an internationally respected forum for scientific research into the technologies and applications of intelligent int

active multimedia systems and services Besides the Preface the book contains sixty four 64 chapters The first four 4 chapters in the book are printed versions of the keynote addresses of the invited speakers of KES IIMSS 2008 Besides the invited speaker chapters the book contains fifteen 15 chapters on recent Advances in Multimedia Data Analysis eleven 11 chapters on Reasoning Approaches nine 9 chapters on Infrastructure of Intelligent Interactive Multimedia Systems and Services fourteen 14 chapters on Multimedia Applications and eleven 11 chapters on Quality of Interactive Multimedia Services

**Theory and Applications of Ordered Fuzzy Numbers** Piotr Prokopowicz, Jacek Czerniak, Dariusz Mikołajewski, Łukasz Apiecionek, Dominik Ślęzak, 2017-10-18 This book is open access under a CC BY 4.0 license This open access book offers comprehensive coverage on Ordered Fuzzy Numbers providing readers with both the basic information and the necessary expertise to use them in a variety of real world applications The respective chapters written by leading researchers discuss the main techniques and applications together with the advantages and shortcomings of these tools in comparison to other fuzzy number representation models Primarily intended for engineers and researchers in the field of fuzzy arithmetic the book also offers a valuable source of basic information on fuzzy models and an easy to understand reference guide to their applications for advanced undergraduate students operations researchers modelers and managers alike *Soft Computing for Information Processing and Analysis* Masoud Nikravesh, Lotfi A. Zadeh, 2006-07-02 Search engines with Google at the top have become the most heavily used online service with millions of searches performed every day and many remarkable capabilities *Soft Computing for Information Processing and Analysis* includes reports from the front of soft computing in the internet industry and imparts knowledge and understanding of the significance of the field's accomplishments new developments and future directions This carefully edited book has evolved from presentations made by the participants of a meeting entitled Fuzzy Logic and the Internet Enhancing the Power of the Internet organized by the Berkeley Initiative in Soft Computing BISC University of California Berkeley It addresses the important topics of modern search engines such as fuzzy query decision analysis and support systems including articles about topics such as Web Intelligence World Knowledge and Fuzzy Logic by Lotfi A Zadeh perception based information processing or web intelligence Meta-attributes and Artificial Networking Kalachand Sain, Priyadarshi Chinmoy Kumar, 2022-06-24 Applying machine learning to the interpretation of seismic data Seismic data gathered on the surface can be used to generate numerous seismic attributes that enable better understanding of subsurface geological structures and stratigraphic features With an ever increasing volume of seismic data available machine learning augments faster data processing and interpretation of complex subsurface geology *Meta Attributes and Artificial Networking A New Tool for Seismic Interpretation* explores how artificial neural networks can be used for the automatic interpretation of 2D and 3D seismic data Volume highlights include Historic evolution of seismic attributes Overview of meta attributes and how to design them Workflows for the computation of meta attributes from seismic data Case studies demonstrating the application of meta attributes Sets of exercises with solutions provided Sample

data sets available for hands on exercises The American Geophysical Union promotes discovery in Earth and space science for the benefit of humanity Its publications disseminate scientific knowledge and provide resources for researchers students and professionals

*Computational Intelligence in Software Modeling* Vishal Jain,Jyotir Moy Chatterjee,Ankita Bansal,Utku Kose,Abha Jain,2022-02-21 Researchers academicians and professionals expone in this book their research in the application of intelligent computing techniques to software engineering As software systems are becoming larger and complex software engineering tasks become increasingly costly and prone to errors Evolutionary algorithms machine learning approaches meta heuristic algorithms and others techniques can help the effi ciency of software engineering

*Advances in Computational Intelligence* Ignacio Rojas,Gonzalo Joya,Joan Cabestany,2013-06-20 This two volume set LNCS 7902 and 7903 constitutes the refereed proceedings of the 12th International Work Conference on Artificial Neural Networks IWANN 2013 held in Puerto de la Cruz Tenerife Spain in June 2013 The 116 revised papers were carefully reviewed and selected from numerous submissions for presentation in two volumes The papers explore sections on mathematical and theoretical methods in computational intelligence neurocomputational formulations learning and adaptation emulation of cognitive functions bio inspired systems and neuro engineering advanced topics in computational intelligence and applications

**MICAI 2006: Advances in Artificial Intelligence** Alexander Gelbukh,Carlos Alberto Reyes-Garcia,2006-11-07 This book constitutes the refereed proceedings of the 5th Mexican International Conference on Artificial Intelligence MICAI 2006 held in Apizaco Mexico in November 2006 It contains over 120 papers that address such topics as knowledge representation and reasoning machine learning and feature selection knowledge discovery computer vision image processing and image retrieval robotics as well as bioinformatics and medical applications

**Fifty Years of Fuzzy Logic and its Applications** Dan E. Tamir,Naphtali D. Rishe,Abraham Kandel,2015-05-23 This book presents a comprehensive report on the evolution of Fuzzy Logic since its formulation in Lotfi Zadeh s seminal paper on fuzzy sets published in 1965 In addition it features a stimulating sampling from the broad field of research and development inspired by Zadeh s paper The chapters written by pioneers and prominent scholars in the field show how fuzzy sets have been successfully applied to artificial intelligence control theory inference and reasoning The book also reports on theoretical issues features recent applications of Fuzzy Logic in the fields of neural networks clustering data mining and software testing and highlights an important paradigm shift caused by Fuzzy Logic in the area of uncertainty management Conceived by the editors as an academic celebration of the fifty years anniversary of the 1965 paper this work is a must have for students and researchers willing to get an inspiring picture of the potentialities limitations achievements and accomplishments of Fuzzy Logic based systems

*Data Science and Machine Learning Applications in Subsurface Engineering* Daniel Asante Otchere,2024-02-06 This book covers unsupervised learning supervised learning clustering approaches feature engineering explainable AI and multioutput regression models for subsurface engineering problems Processing voluminous and complex data sets are the primary focus of the field of machine

learning ML ML aims to develop data driven methods and computational algorithms that can learn to identify complex and non linear patterns to understand and predict the relationships between variables by analysing extensive data Although ML models provide the final output for predictions several steps need to be performed to achieve accurate predictions These steps data pre processing feature selection feature engineering and outlier removal are all contained in this book New models are also developed using existing ML architecture and learning theories to improve the performance of traditional ML models and handle small and big data without manual adjustments This research oriented book will help subsurface engineers geophysicists and geoscientists become familiar with data science and ML advances relevant to subsurface engineering Additionally it demonstrates the use of data driven approaches for salt identification seismic interpretation estimating enhanced oil recovery factor predicting pore fluid types petrophysical property prediction estimating pressure drop in pipelines bubble point pressure prediction enhancing drilling mud loss smart well completion and synthetic well log predictions

**Computational Intelligence Techniques in Earth and Environmental Sciences** Tanvir Islam, Prashant K. Srivastava, Manika Gupta, Xuan Zhu, Saumitra Mukherjee, 2014-02-14 Computational intelligence techniques have enjoyed growing interest in recent decades among the earth and environmental science research communities for their powerful ability to solve and understand various complex problems and develop novel approaches toward a sustainable earth This book compiles a collection of recent developments and rigorous applications of computational intelligence in these disciplines Techniques covered include artificial neural networks support vector machines fuzzy logic decision making algorithms supervised and unsupervised classification algorithms probabilistic computing hybrid methods and morphic computing Further topics given treatment in this volume include remote sensing meteorology atmospheric and oceanic modeling climate change environmental engineering and management catastrophic natural hazards air and environmental pollution and water quality By linking computational intelligence techniques with earth and environmental science oriented problems this book promotes synergistic activities among scientists and technicians working in areas such as data mining and machine learning We believe that a diverse group of academics scientists environmentalists meteorologists and computing experts with a common interest in computational intelligence techniques within the earth and environmental sciences will find this book to be of great value

*Frontiers of Geographic Information Technology* Sanjay Rana, Jayant Sharma, 2006-02-08 Although designed primarily for desktop mapping and analysis Geographic Information Systems have for some years been coupled to other allied technologies This coupling or integration has occurred for some time due to the limitations in commercially available systems It has occurred in several areas including visualisation virtual reality simulation pedestrian urban modelling data storage and management distributed or Internet GIS and decision support The chapters of the book written by an international group of experts examine several of these discrete areas focussing on the use of GIS and the technology it has been allied to

*Hydrocarbon Exploration and Production* Frank Jahn, Mark Cook, Mark Graham, 2008-03-13

Hydrocarbon Exploration and Production Second Edition is a comprehensive and current introduction to the upstream industry drawing together the many inter disciplinary links within the industry It presents all the major stages in the life of an oil or gas field from gaining access to opportunity through exploration appraisal development planning production and finally to decommissioning It also explains the fiscal and commercial environment in which oil and gas field development takes place The book is written for industry professionals who wish to be better informed about the basic technical and commercial methods concepts and techniques used in the upstream oil and gas business The authors are the founders of TRACS International a company which has provided training and consultancy in Exploration and Production related issues for many clients world wide since 1992 Clearly written in a concise and straightforward manner Features detailed technical illustrations to maximize learning Presents major advances in the industry including technical methods for field evaluation and development and techniques used for managing risk within the business Developed from TRACS International course materials discussions with clients and material available in the public domain

**Theoretical Advances and Applications of Fuzzy Logic and Soft Computing** Oscar Castillo,Patricia Melin,Oscar Montiel Ross,Witold Pedrycz,Roberto Sepúlveda Cruz,2007-06-08 This book comprises a selection of papers on theoretical advances and applications of fuzzy logic and soft computing from the IFSA 2007 World Congress held in Cancun Mexico June 2007 These papers constitute an important contribution to the theory and applications of fuzzy logic and soft computing methodologies

*Advances and New Developments in Fuzzy Logic and Technology* Krassimir T. Atanassov,Vassia Atanassova,Janusz Kacprzyk,Andrzej Kałuszko,Maciej Krawczak,Jan W. Owsiniński,Sotir S. Sotirov,Evdokia Sotirova,Eulalia Szmidt,Sławomir Zadrozny,2021-07-02 This book is composed of selected papers presented at IWIFSGN 2019 The Eighteenth International Workshop on Intuitionistic Fuzzy Sets and Generalized Nets held on October 24 25 2019 in Warsaw Poland which is one of the main conferences on fuzzy logic notably on extensions of the traditional fuzzy sets in particular on the intuitionistic fuzzy sets A considerable part of the conference sessions is also concerned with recent developments and challenges in the theory and applications of other topics exemplified by uncertainty incompleteness and imprecision modeling the Generalized Nets GNs a powerful extension of the traditional Petri net paradigm and the InterCriteria Analysis a new method for the feature selection and analyses in multicriteria and multiattribute decision making problems Some more general problems of computational and artificial intelligence exemplified by evolutionary computations machine learning etc are also dealt with The papers included yield a good perspective on all of these important issues and problems

Geology and Geochemistry of Oil and Gas L. Buryakovsky,N.A. Eremenko,M.V. Gorfunkel,G.V. Chilingarian,2005-10-13 This book discusses the progress that is being made through innovations in instrumental measurements of geologic and geochemical systems and their study using modern mathematical modeling It covers the systems approach to understanding sedimentary rocks and their role in evolution and containment of subsurface fluids Fundamental aspects of petroleum geology and geochemistry generation migration



accumulation evaluation and production of hydrocarbons are discussed with worldwide examples Various physical and chemical properties of subsurface waters crude oils and natural gases are described which is especially important to production engineering Among various properties of liquid and gaseous hydrocarbons the most important are wettability affecting production characteristics and ultimate recovery relative permeability affecting reservoir fluid flow to the production wells density differences between immiscible fluids which affects gravity drainage viscosity of subsurface fluids affecting the relative mobility of each fluid and fluid chemistry which affects the absorption ultimate recovery and monetary value of produced hydrocarbons Discussion of the formation and accumulation of hydrocarbons includes 1 the changes in the chemical composition of hydrocarbons that originate from the debris of living plants and organisms to form crude oil and natural gas 2 the origin of hydrocarbons in different areas of a single reservoir 3 the conditions which determine the distribution of water oil and gas in the reservoir 4 the migration of subsurface fluids until they eventually accumulate in isolated traps 5 discussion of the traps as a function of sedimentary geology and tectonics This is based on the systems approach to the specific geologic and geochemical systems using analytical and statistical principles and examples of modern mathematical modeling of static and dynamic systems Discusses fundamental aspects of petroleum geology and geochemistry and generation migration accumulation evaluation and production of hydrocarbons Presents a systems approach to the specific geologic and geochemical systems

The book delves into Soft Computing And Intelligent Data Analysis In Oil Exploration. Soft Computing And Intelligent Data Analysis In Oil Exploration is an essential topic that must be grasped by everyone, ranging from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Soft Computing And Intelligent Data Analysis In Oil Exploration, encompassing both the fundamentals and more intricate discussions.

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    - Chapter 5: Conclusion
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  5. In chapter 4, the author will scrutinize the relevance of Soft Computing And Intelligent Data Analysis In Oil Exploration in specific contexts. This chapter will explore how Soft Computing And Intelligent Data Analysis In Oil Exploration is applied in specialized fields, such as education, business, and technology.
  6. In chapter 5, the author will draw a conclusion about Soft Computing And Intelligent Data Analysis In Oil Exploration. This chapter will summarize the key points that have been discussed throughout the book.
- The book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Soft Computing And Intelligent Data Analysis In Oil Exploration.

## **Table of Contents Soft Computing And Intelligent Data Analysis In Oil Exploration**

1. Understanding the eBook Soft Computing And Intelligent Data Analysis In Oil Exploration
  - The Rise of Digital Reading Soft Computing And Intelligent Data Analysis In Oil Exploration
  - Advantages of eBooks Over Traditional Books
2. Identifying Soft Computing And Intelligent Data Analysis In Oil Exploration
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Soft Computing And Intelligent Data Analysis In Oil Exploration
  - User-Friendly Interface
4. Exploring eBook Recommendations from Soft Computing And Intelligent Data Analysis In Oil Exploration
  - Personalized Recommendations
  - Soft Computing And Intelligent Data Analysis In Oil Exploration User Reviews and Ratings
  - Soft Computing And Intelligent Data Analysis In Oil Exploration and Bestseller Lists
5. Accessing Soft Computing And Intelligent Data Analysis In Oil Exploration Free and Paid eBooks
  - Soft Computing And Intelligent Data Analysis In Oil Exploration Public Domain eBooks
  - Soft Computing And Intelligent Data Analysis In Oil Exploration eBook Subscription Services
  - Soft Computing And Intelligent Data Analysis In Oil Exploration Budget-Friendly Options
6. Navigating Soft Computing And Intelligent Data Analysis In Oil Exploration eBook Formats
  - ePub, PDF, MOBI, and More
  - Soft Computing And Intelligent Data Analysis In Oil Exploration Compatibility with Devices
  - Soft Computing And Intelligent Data Analysis In Oil Exploration Enhanced eBook Features
7. Enhancing Your Reading Experience

- Adjustable Fonts and Text Sizes of Soft Computing And Intelligent Data Analysis In Oil Exploration
- Highlighting and Note-Taking Soft Computing And Intelligent Data Analysis In Oil Exploration
- Interactive Elements Soft Computing And Intelligent Data Analysis In Oil Exploration
- 8. Staying Engaged with Soft Computing And Intelligent Data Analysis In Oil Exploration
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Soft Computing And Intelligent Data Analysis In Oil Exploration
- 9. Balancing eBooks and Physical Books Soft Computing And Intelligent Data Analysis In Oil Exploration
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Soft Computing And Intelligent Data Analysis In Oil Exploration
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Soft Computing And Intelligent Data Analysis In Oil Exploration
  - Setting Reading Goals Soft Computing And Intelligent Data Analysis In Oil Exploration
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Soft Computing And Intelligent Data Analysis In Oil Exploration
  - Fact-Checking eBook Content of Soft Computing And Intelligent Data Analysis In Oil Exploration
  - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
- 14. Embracing eBook Trends
  - Integration of Multimedia Elements
  - Interactive and Gamified eBooks

### Soft Computing And Intelligent Data Analysis In Oil Exploration Introduction

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