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In Petroleum Geosciences

# ***Artificial Intelligent Approaches In Petroleum Geosciences***

The Enhanced Oil Recovery Series delivers a multivolume approach that addresses the latest research on various types of EOR. The second volume in the series, Gas Injection Methods, helps engineers focus on the latest developments in one of the fastest growing areas. Different techniques are described in addition to the latest technology such as data mining and unconventional reservoirs. Supported field case

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studies are included to show a bridge between research and practical application, making it useful for both academics and practicing engineers. Structured to start with an introduction on various gas types and different gas injection methods, screening criteria for choosing gas injection method, and environmental issues during gas injection methods, the editors then advance on to more complex content, guiding the engineer into newer topics involving CO<sub>2</sub> such as injection in tight oil reservoirs, shale oil reservoirs, carbonated water, data mining, and formation damage. Supported by a full spectrum

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of contributors, this book gives petroleum engineers and researchers the latest research developments and field applications to drive innovation for the future. Helps readers understand the latest research and practical applications specific to foam flooding and gas injection Provides readers with the latest technology, including nanoparticle-stabilized foam for mobility control and carbon storage in shale oil reservoirs Teaches users about additional methods such as data mining applications and economic and environmental considerations How can environmental scientists and engineers

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use the increasing amount of available data to enhance our understanding of planet Earth, its systems and processes? This book describes various potential approaches based on artificial intelligence (AI) techniques, including neural networks, decision trees, genetic algorithms and fuzzy logic. Part I contains a series of tutorials describing the methods and the important considerations in applying them. In Part II, many practical examples illustrate the power of these techniques on actual environmental problems. International experts bring to life ways to apply AI to problems in the environmental sciences. While

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one culture entwines ideas with a thread, another links them with a red line. Thus, a “red thread” ties the book together, weaving a tapestry that pictures the ‘natural’ data-driven AI methods in the light of the more traditional modeling techniques, and demonstrating the power of these data-based methods.

Artificial Intelligence (AI), when incorporated with machine learning and deep learning algorithms, has a wide variety of applications today. This book focuses on the implementation of various elementary and advanced approaches in AI that can be used in various domains to solve real-time

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decision-making problems. The book focuses on concepts and techniques used to run tasks in an automated manner. It discusses computational intelligence in the detection and diagnosis of clinical and biomedical images, covers the automation of a system through machine learning and deep learning approaches, presents data analytics and mining for decision-support applications, and includes case-based reasoning, natural language processing, computer vision, and AI approaches in real-time applications. Academic scientists, researchers, and students in the various domains of computer science

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engineering, electronics and communication engineering, and information technology, as well as industrial engineers, biomedical engineers, and management, will find this book useful. By the end of this book, you will understand the fundamentals of AI. Various case studies will develop your adaptive thinking to solve real-time AI problems. Features Includes AI-based decision-making approaches Discusses computational intelligence in the detection and diagnosis of clinical and biomedical images Covers automation of systems through machine learning and deep learning approaches and its implications to the

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real world Presents data analytics and mining for decision-support applications Offers case-based reasoning

Power System Fault Diagnosis: A Wide Area Measurement Based Intelligent Approach is a comprehensive overview of the growing interests in efficient diagnosis of power system faults to reduce outage duration and revenue losses by expediting the restoration process. This book illustrates intelligent fault diagnosis schemes for power system networks, at both transmission and distribution levels, using data acquired from phasor measurement units. It presents the power



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grid modeling, fault modeling, feature extraction processes, and various fault diagnosis techniques, including artificial intelligence techniques, in steps. The book also incorporates uncertainty associated with line parameters, fault information (resistance and inception angle), load demand, renewable energy generation, and measurement noises. Provides step-by-step modeling of power system networks (distribution and transmission) and faults in MATLAB/SIMULINK and real-time digital simulator (RTDS) platforms Presents feature extraction processes using advanced signal processing techniques (discrete wavelet

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and Stockwell transforms) and an easy-to-understand optimal feature selection method Illustrates comprehensive results in the graphical and tabular formats that can be easily reproduced by beginners Highlights various utility practices for fault location in transmission networks, distribution systems, and underground cables. The Quest for Artificial Intelligence Encyclopedia of Artificial Intelligence Symbolic and ComputationalL... Machine Learning in the Oil and Gas Industry Methods, Technologies, Systems, Applications and Policy Making

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### Wax Deposition

Apply machine and deep learning to solve some of the challenges in the oil and gas industry. The book begins with a brief discussion of the oil and gas exploration and production life cycle in the context of data flow through the different stages of industry operations. This leads to a survey of some interesting problems, which are good candidates for applying machine and deep learning approaches. The initial chapters provide a primer on the Python programming language used for implementing the algorithms; this is followed by an overview of supervised and unsupervised machine learning concepts. The authors provide industry examples using open source data sets along with practical explanations of the algorithms, without diving too deep into the theoretical

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aspects of the algorithms employed. Machine Learning in the Oil and Gas Industry covers problems encompassing diverse industry topics, including geophysics (seismic interpretation), geological modeling, reservoir engineering, and production engineering. Throughout the book, the emphasis is on providing a practical approach with step-by-step explanations and code examples for implementing machine and deep learning algorithms for solving real-life problems in the oil and gas industry. What You Will Learn Understanding the end-to-end industry life cycle and flow of data in the industrial operations of the oil and gas industry Get the basic concepts of computer programming and machine and deep learning required for implementing the algorithms used Study interesting industry problems that are good candidates for

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being solved by machine and deep learning Discover the practical considerations and challenges for executing machine and deep learning projects in the oil and gas industry Who This Book Is For Professionals in the oil and gas industry who can benefit from a practical understanding of the machine and deep learning approach to solving real-life problems.

The IDEAL conference boast a vibrant and successful history dating back to 1998, th and this edition marked the 10 anniversary, an important milestone demonstrating the increasing popularity and high quality of the IDEAL conferences. Burgos, the capital of medieval Spain and a lively city today, was a perfect venue to celebrate such an occasion. The conference has become a unique, established

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and broad inter-disciplinary forum for researchers and practitioners in many fields to interact with each other and with leading academics and industries in the areas of machine learning, information processing, data mining, knowledge management, bio-informatics, neuro-informatics, bio-inspired models, agents and distributed systems, and hybrid systems. IDEAL 2009 received over 200 submissions. After a rigorous peer-review process, the International Programme Committee accepted 100 high-quality papers to be included in the conference proceedings. In this 10th edition, a special emphasis was given on the organization of workshops and special sessions. Two workshops were organized under the framework of IDEAL 2009: MIR Day 2009 and Nature-Inspired Models for Industrial Applications.

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Five special sessions were organized by leading researchers in their fields on various topics such as Soft Computing Techniques in Data Mining, - cent Advances on Swarm-Based Computing, Intelligent Computational Techniques in Medical Image Processing, Advances on Ensemble Learning and Information Fusion, and Financial and Business Engineering (Modelling and Applications).

Today, raw data on any industry is widely available. With the help of artificial intelligence (AI) and machine learning (ML), this data can be used to gain meaningful insights. In addition, as data is the new raw material for today's world, AI and ML will be applied in every industrial sector. Industry 4.0 mainly focuses on the automation of things. From that perspective, the oil and gas industry is one of the largest industries in

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terms of economy and energy. Applications of Artificial Intelligence (AI) and Machine Learning (ML) in the Petroleum Industry analyzes the use of AI and ML in the oil and gas industry across all three sectors, namely upstream, midstream, and downstream. It covers every aspect of the petroleum industry as related to the application of AI and ML, ranging from exploration, data management, extraction, processing, real-time data analysis, monitoring, cloud-based connectivity system, and conditions analysis, to the final delivery of the product to the end customer, while taking into account the incorporation of the safety measures for a better operation and the efficient and effective execution of operations. This book explores the variety of applications that can be integrated to support the existing petroleum and



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adjacent sectors to solve industry problems. It will serve as a useful guide for professionals working in the petroleum industry, industrial engineers, AI and ML experts and researchers, as well as students.

Explainable artificial intelligence is proficient in operating and analyzing the unconstrained environment in fields like robotic medicine, robotic treatment, and robotic surgery, which rely on computational vision for analyzing complex situations.

Explainable artificial intelligence is a well-structured customizable technology that makes it possible to generate promising unbiased outcomes. The model's adaptability facilitates the management of heterogeneous healthcare data and the visualization of biological structures through virtual reality. Explainable artificial intelligence has newfound

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applications in the healthcare industry, such as clinical trial matching, continuous healthcare monitoring, probabilistic evolutions, and evidence-based mechanisms. Principles and Methods of Explainable Artificial Intelligence in Healthcare discusses explainable artificial intelligence and its applications in healthcare, providing a broad overview of state-of-the-art approaches for accurate analysis and diagnosis. The book also encompasses computational vision processing techniques that handle complex data like physiological information, electronic healthcare records, and medical imaging data that assist in earlier prediction. Covering topics such as neural networks and disease detection, this reference work is ideal for industry professionals, practitioners, academicians, researchers, scholars,

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instructors, and students.

Artificial Intelligence and Expert Systems in Petroleum Exploration

Proceedings of the International Conference on Artificial Intelligence and Applied Mathematics in Engineering (ICAIAME 2019)

Applications of Artificial Intelligence Techniques in the Petroleum Industry

Handbook of Research on Innovative Management Using AI in Industry 5.0

A Wide Area Measurement Based Intelligent Approach

Principles and Methods of Explainable Artificial Intelligence in Healthcare

This book features research presented at the

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1st International Conference on Artificial Intelligence and Applied Mathematics in Engineering, held on 20–22 April 2019 at Antalya, Manavgat (Turkey). In today's world, various engineering areas are essential components of technological innovations and effective real-world solutions for a better future. In this context, the book focuses on problems in engineering and discusses research using artificial intelligence and applied mathematics. Intended for scientists, experts, M.Sc. and Ph.D. students, postdocs

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and anyone interested in the subjects covered, the book can also be used as a reference resource for courses related to artificial intelligence and applied mathematics.

"This book is a comprehensive and in-depth reference to the most recent developments in the field covering theoretical developments, techniques, technologies, among others"--Provided by publisher.

This book presents unique features of the adaptive modeling approach based on new

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machine learning algorithms for petroleum exploration, development, and production. The adaptive approach helps simulation engineers and geoscientists to create adequate geological and hydrodynamic models. This approach is proven to be a real alternative to traditional techniques, such as deterministic modeling. Currently, machine-learning algorithms grow in popularity because they provide consistency, predictiveness, and convenience. The primary purpose of this book is to describe the

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theoretical state of the adaptive approach and show some examples of its implementation in simulation and forecasting different reservoir processes.

Wax Deposition: Experimental Characterizations, Theoretical Modeling, and Field Practices covers the entire spectrum of knowledge on wax deposition. The book delivers a detailed description of the thermodynamic and transport theories for wax deposition modeling as well as a comprehensive review of laboratory testing

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for the establishment of appropriate field control strategies. Offering valuable insight from academic research and the flow assurance industry, this balanced text: Discusses the background of wax deposition, including the cause of the phenomenon, the magnitude of the problem, and its impact on petroleum production Introduces laboratory techniques and theoretical models to measure and predict key parameters of wax precipitation, such as the wax appearance temperature and the wax precipitation curve



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Explains how to conduct and interpret laboratory experiments to benchmark different wax deposition models, to better understand wax deposition behaviors, and to predict wax deposit growth for the field  
Presents various models for wax deposition, analyzing the advantages and disadvantages of each and evaluating the differences between the assumptions used  
Provides numerous examples of how field management strategies for wax deposition can be established based on laboratory testing and

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modeling work Wax Deposition: Experimental Characterizations, Theoretical Modeling, and Field aids flow assurance engineers in identifying the severity and controlling the problem of wax deposition. The book also shows students and researchers how fundamental principles of thermodynamics, heat, and mass transfer can be applied to solve a problem common to the petroleum industry.

Experimental Characterizations, Theoretical Modeling, and Field Practices

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Automation and Data Solutions

Coring Methods and Systems

Automated Pattern Analysis in Petroleum  
Exploration

AI Superpowers

Application of Artificial Intelligence to  
Reservoir Characterization

*This book presents several intelligent approaches for tackling and solving challenging practical problems facing those in the petroleum geosciences and petroleum industry. Written by experienced academics, this book offers state-of-the-art working examples and provides the reader with exposure to the latest developments in the field of intelligent methods applied to oil and*

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*gas research, exploration and production. It also analyzes the strengths and weaknesses of each method presented using benchmarking, whilst also emphasizing essential parameters such as robustness, accuracy, speed of convergence, computer time, overlearning and the role of normalization. The intelligent approaches presented include artificial neural networks, fuzzy logic, active learning method, genetic algorithms and support vector machines, amongst others. Integration, handling data of immense size and uncertainty, and dealing with risk management are among crucial issues in petroleum geosciences. The problems we have to solve in this domain are becoming too complex to rely on a single discipline for effective solutions and the costs associated with poor predictions (e.g. dry holes) increase. Therefore, there is a need to establish a new approach aimed at proper integration of*

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*disciplines (such as petroleum engineering, geology, geophysics and geochemistry), data fusion, risk reduction and uncertainty management. These intelligent techniques can be used for uncertainty analysis, risk assessment, data fusion and mining, data analysis and interpretation, and knowledge discovery, from diverse data such as 3-D seismic, geological data, well logging, and production data. This book is intended for petroleum scientists, data miners, data scientists and professionals and post-graduate students involved in petroleum industry.*

*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*

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*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*

**ARTIFICIAL INTELLIGENCE AND DATA ANALYTICS FOR**

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*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*

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*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.*

*This book covers applications of machine learning in artificial intelligence. The specific topics covered include human language,*



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*heterogeneous and streaming data, unmanned systems, neural information processing, marketing and the social sciences, bioinformatics and robotics, etc. It also provides a broad range of techniques that can be successfully applied and adopted in different areas. Accordingly, the book offers an interesting and insightful read for scholars in the areas of computer vision, speech recognition, healthcare, business, marketing, and bioinformatics.*

*Selection and Estimation*

*China, Silicon Valley, and the New World Order*

*Artificial Intelligence and Its Applications*

*Machine Learning and Artificial Intelligence in Geosciences*

*Machine Learning and Data Science in the Oil and Gas Industry*

*Artificial Intelligence and Applied Mathematics in Engineering*

*Problems*

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Drilling and production wells are becoming more digitalized as oil and gas companies continue to implement machine learning and big data solutions to save money on projects while reducing energy and emissions. Up to now there has not been one cohesive resource that bridges the gap between theory and application, showing how to go from computer modeling to practical use. *Methods for Petroleum Well Optimization: Automation and Data Solutions* gives today's engineers and researchers real-time data solutions specific to drilling and production assets. Structured for training, this reference covers key concepts and detailed approaches from mathematical to real-time data solutions through technological advances.

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Topics include digital well planning and construction, moving teams into Onshore Collaboration Centers, operations with the best machine learning (ML) and metaheuristic algorithms, complex trajectories for wellbore stability, real-time predictive analytics by data mining, optimum decision-making, and case-based reasoning. Supported by practical case studies, and with references including links to open-source code and fit-for-use MATLAB, R, Julia, Python and other standard programming languages, *Methods for Petroleum Well Optimization* delivers a critical training guide for researchers and oil and gas engineers to take scientifically based approaches to solving real field problems. Bridges

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the gap between theory and practice (from models to code) with content from the latest research developments supported by practical case study examples and questions at the end of each chapter Enables understanding of real-time data solutions and automation methods available specific to drilling and production wells, such as digital well planning and construction through to automatic systems Promotes the use of open-source code which will help companies, engineers, and researchers develop their prediction and analysis software more quickly; this is especially appropriate in the application of multivariate techniques to the real-world problems of petroleum well optimization

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Petroleum Production Engineering, Second Edition, updates both the new and veteran engineer on how to employ day-to-day production fundamentals to solve real-world challenges with modern technology. Enhanced to include equations and references with today's more complex systems, such as working with horizontal wells, workovers, and an entire new section of chapters dedicated to flow assurance, this go-to reference remains the most all-inclusive source for answering all upstream and midstream production issues. Completely updated with five sections covering the entire production spectrum, including well productivity, equipment and facilities, well stimulation and workover, artificial lift methods, and flow

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assurance, this updated edition continues to deliver the most practical applied production techniques, answers, and methods for today's production engineer and manager. In addition, updated Excel spreadsheets that cover the most critical production equations from the book are included for download. Updated to cover today's critical production challenges, such as flow assurance, horizontal and multi-lateral wells, and workovers Guides users from theory to practical application with the help of over 50 online Excel spreadsheets that contain basic production equations, such as gas lift potential, multilateral gas well deliverability, and production forecasting Delivers an all-inclusive product with real-world answers for

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training or quick look up solutions for the entire petroleum production spectrum

Here is a state-of-the-art survey of artificial intelligence in modern exploration programs. Focussing on standard exploration procedures, the contributions examine the advantages and pitfalls of using these new techniques, and, in the process, provide new, more accurate and consistent methods for solving old problems. They show how expert systems can provide the integration of information that is essential in the petroleum industry when solving the complicated questions facing the modern petroleum geoscientist.

Artificial intelligence (AI) is a field within computer science

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that is attempting to build enhanced intelligence into computer systems. This book traces the history of the subject, from the early dreams of eighteenth-century (and earlier) pioneers to the more successful work of today's AI engineers. AI is becoming more and more a part of everyone's life. The technology is already embedded in face-recognizing cameras, speech-recognition software, Internet search engines, and health-care robots, among other applications. The book's many diagrams and easy-to-understand descriptions of AI programs will help the casual reader gain an understanding of how these and other AI systems actually work. Its thorough (but unobtrusive) end-of-chapter notes containing citations to



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important source materials will be of great use to AI scholars and researchers. This book promises to be the definitive history of a field that has captivated the imaginations of scientists, philosophers, and writers for centuries.

A Step-by-Step Breakdown with Data, Algorithms, Codes, and Applications

10th International Conference, Burgos, Spain, September 23-26, 2009, Proceedings

Intelligent Data Engineering and Automated Learning - IDEAL 2009

Methods and Applications in Petroleum and Mineral Exploration and Engineering Geology

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Machine Learning and Deep Learning in Real-Time  
Applications

Petroleum Production Engineering

**Methods and Applications in Petroleum  
and Mineral Exploration and Engineering**

**Geology is an interdisciplinary book  
bridging the fields of earth sciences  
and engineering. It covers topics on  
natural resources exploration as well  
as the application of geological  
exploration methods and techniques to  
engineering problems. Each topic is**

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presented through theoretical approaches that are illustrated by case studies from around the globe. Methods and Applications in Petroleum and Mineral Exploration and Engineering Geology is a key resource for both academics and professionals, offering both practical and applied knowledge in resources exploration and engineering geology. Features new exploration technologies including seismic, satellite images, basin studies,

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geochemical modeling and analysis  
Presents cases studies from different  
countries such as the Hoggar area  
(Algeria), Urals and Siberia (Russia),  
North of Chile (II and III regions),  
and North of Italy (Trentino Alto  
adige) Includes applications of the  
novel methods discussed  
PVT properties are necessary for  
reservoir/well performance forecast and  
optimization. In absence of PVT  
laboratory measurements, finding the

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right correlation to estimate accurate PVT properties could be challenging. PVT Property Correlations: Selection and Estimation discusses techniques to properly calculate PVT properties from limited information. This book covers how to prepare PVT properties for dry gases, wet gases, gas condensates, volatile oils, black oils, and low gas-oil ratio oils. It also explains the use of artificial neural network models in generating PVT properties. It

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presents numerous examples to explain step-by-step procedures in using techniques designed to deliver the most accurate PVT properties from correlations. Complimentary to this book is PVT correlation calculator software. Many of the techniques discussed in this book are available with the software. This book shows the importance of PVT data, provides practical tools to calculate PVT properties, and helps engineers select

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PVT correlations so they can model, optimize, and forecast their assets. Understand how to prepare PVT data in absence of laboratory reports for all fluid types Become equipped with a comprehensive list of PVT correlations and their applicability ranges Learn about ANN models and their applications in providing PVT data Become proficient in selecting best correlations and improving correlations results This book is a practical guide to

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downhole rock sampling and coring concepts, methods, systems, and procedures for practitioners and researchers. Its chapters are based upon years of extensive studies and research about the coring methods and via direct and continuous communication and consultation obtained from various service and operator companies such as Baker Hughes GE, NOV, OMV, and Sandvik. The contributors discuss the state-of-the-art coring methods and systems



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(mainly used in the petroleum industry), which include: · conventional coring; · wireline continuous coring; · invasion mitigation coring (low invasion, gel coring, sponge coring); · jam-detection, anti-jamming, full closure; · safe-coring and tripping; · oriented-coring; · pressure/in-situ coring; · logging-while-coring; · motor coring; · mini-coring; · coiled Tubing Coring; and · underbalanced coring. The

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contributors provide practical and applicable understanding of the procedures of these coring methods and systems, as well as the specific core barrel components, working mechanisms, and schematics of the tools and processes used. Because Coring Methods and Systems analyses and compares the core barrels used in both petroleum and mining industries, it enhances the communication and may allow knowledge transfer between the two industries. As

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core damage is a serious issue during coring and handling jeopardizing correct calibration of exploration data, Coring Methods and Systems has greatly focused on its identification and its mitigation. Therefore, it can be used as an ideal source for geologists, core analysts, and reservoir engineers, to ensure the retrieval of high-quality cores. Machine Learning and Data Science in the Oil and Gas Industry explains how

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machine learning can be specifically tailored to oil and gas use cases. Petroleum engineers will learn when to use machine learning, how it is already used in oil and gas operations, and how to manage the data stream moving forward. Practical in its approach, the book explains all aspects of a data science or machine learning project, including the managerial parts of it that are so often the cause for failure. Several real-life case studies

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round out the book with topics such as predictive maintenance, soft sensing, and forecasting. Viewed as a guide book, this manual will lead a practitioner through the journey of a data science project in the oil and gas industry circumventing the pitfalls and articulating the business value. Chart an overview of the techniques and tools of machine learning including all the non-technological aspects necessary to be successful Gain practical

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understanding of machine learning used  
in oil and gas operations through  
contributed case studies Learn change  
management skills that will help gain  
confidence in pursuing the technology  
Understand the workflow of a full-scale  
project and where machine learning  
benefits (and where it does not)  
Artificial Intelligence in the Oil  
Industry  
Smart Proxy Modeling  
An Interdisciplinary Approach

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## **Artificial Intelligence and Machine Learning in Numerical Simulation Knowledge Based Systems, Neural Networks, Fuzzy Logic : Special Issue PVT Property Correlations**

Artificial intelligence and its various components are rapidly engulfing almost every professional industry. Specific features of AI that have proven to be vital solutions to numerous real-world issues are machine learning and deep learning. These intelligent agents unlock higher levels of performance and efficiency, creating a wide span of industrial applications. However, there is a lack of research on the specific uses of machine/deep learning in the professional realm. Machine

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Learning and Deep Learning in Real-Time Applications provides emerging research exploring the theoretical and practical aspects of machine learning and deep learning and their implementations as well as their ability to solve real-world problems within several professional disciplines including healthcare, business, and computer science.

Featuring coverage on a broad range of topics such as image processing, medical improvements, and smart grids, this book is ideally designed for researchers, academicians, scientists, industry experts, scholars, IT professionals, engineers, and students seeking current research on the multifaceted uses and implementations of machine learning and deep learning across the globe.

Advances in Geophysics, Volume 61 - Machine Learning and



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Artificial Intelligence in Geosciences, the latest release in this highly-respected publication in the field of geophysics, contains new chapters on a variety of topics, including a historical review on the development of machine learning, machine learning to investigate fault rupture on various scales, a review on machine learning techniques to describe fractured media, signal augmentation to improve the generalization of deep neural networks, deep generator priors for Bayesian seismic inversion, as well as a review on homogenization for seismology, and more. Provides high-level reviews of the latest innovations in geophysics Written by recognized experts in the field Presents an essential publication for researchers in all fields of geophysics

Machine Learning Guide for Oil and Gas Using Python: A

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Step-by-Step Breakdown with Data, Algorithms, Codes, and Applications delivers a critical training and resource tool to help engineers understand machine learning theory and practice, specifically referencing use cases in oil and gas. The reference moves from explaining how Python works to step-by-step examples of utilization in various oil and gas scenarios, such as well testing, shale reservoirs and production optimization. Petroleum engineers are quickly applying machine learning techniques to their data challenges, but there is a lack of references beyond the math or heavy theory of machine learning. Machine Learning Guide for Oil and Gas Using Python details the open-source tool Python by explaining how it works at an introductory level then bridging into how to apply the algorithms into different oil

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and gas scenarios. While similar resources are often too mathematical, this book balances theory with applications, including use cases that help solve different oil and gas data challenges. Helps readers understand how open-source Python can be utilized in practical oil and gas challenges  
Covers the most commonly used algorithms for both supervised and unsupervised learning  
Presents a balanced approach of both theory and practicality while progressing from introductory to advanced analytical techniques  
Numerical simulation models are used in all engineering disciplines for modeling physical phenomena to learn how the phenomena work, and to identify problems and optimize behavior. Smart Proxy Models provide an opportunity to replicate numerical simulations with very high accuracy and

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can be run on a laptop within a few minutes, thereby simplifying the use of complex numerical simulations, which can otherwise take tens of hours. This book focuses on Smart Proxy Modeling and provides readers with all the essential details on how to develop Smart Proxy Models using Artificial Intelligence and Machine Learning, as well as how it may be used in real-world cases. Covers replication of highly accurate numerical simulations using Artificial Intelligence and Machine Learning Details application in reservoir simulation and modeling and computational fluid dynamics Includes real case studies based on commercially available simulators Smart Proxy Modeling is ideal for petroleum, chemical, environmental, and mechanical engineers, as well as statisticians and others working with applications of data-

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driven analytics.

Methods for Petroleum Well Optimization

Including Geosciences, Reservoir Engineering, and  
Production Engineering with Python

Applications of Artificial Intelligence (AI) and Machine  
Learning (ML) in the Petroleum Industry

Proceeding of the 2nd International Conference on Artificial  
Intelligence and Its Applications (2021)

Best Practices, Tools, and Case Studies

Artificial Intelligent Approaches in Petroleum Geosciences

*There is no industry left where artificial  
intelligence is not used in some capacity.*

*The application of this technology has  
already stretched across a multitude of*

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*domains including law and policy; it will soon permeate areas beyond anyone's imagination. Technology giants such as Google, Apple, and Facebook are already investing their money, effort, and time toward integrating artificial intelligence. As this technology continues to develop and expand, it is critical for everyone to understand the various applications of artificial intelligence and its full potential. The Handbook of Research on Innovative Management Using AI in Industry 5.0 uncovers new and innovative features of artificial intelligence and how it can help*

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*in raising economic efficiency at both micro and macro levels and provides a deeper understanding of the relevant aspects of artificial intelligence impacting efficacy for better output. Covering topics such as consumer behavior, information technology, and personalized banking, it is an ideal resource for researchers, academicians, policymakers, business professionals, companies, and students.*

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Copycats in the Coliseum -- China's alternate  
Internet universe -- A tale of two countries  
-- The four waves of AI -- Utopia, dystopia,*

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*and the real AI crisis -- The wisdom of cancer -- A blueprint for human co-existence with AI -- Our global AI story*

*Artificial intelligence (AI) is a subject garnering increasing attention in both academia and the industry today. The understanding is that AI-enhanced methods and techniques create a variety of opportunities related to improving basic and advanced business functions, including production processes, logistics, financial management and others. As this collection demonstrates, AI-enhanced tools and methods tend to offer more precise results in the fields of*



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*engineering, financial accounting, tourism, air-pollution management and many more. The objective of this collection is to bring these topics together to offer the reader a useful primer on how AI-enhanced tools and applications can be of use in today's world. In the context of the frequently fearful, skeptical and emotion-laden debates on AI and its value added, this volume promotes a positive perspective on AI and its impact on society. AI is a part of a broader ecosystem of sophisticated tools, techniques and technologies, and therefore, it is not immune to developments in that ecosystem. It is thus*

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*imperative that inter- and multidisciplinary research on AI and its ecosystem is encouraged. This collection contributes to that.*

*Artificial Intelligence and Cognitive Computing*

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