

Application of Artificial Intelligence & Data Mining in Production Optimization

1.6 CEUs (Continuing Education Units/8 hours) awarded for this 2-day course.

Instructor

Shahab D. Mohaghegh, West Virginia University & Intelligent Solutions, Inc.

Intended Audience

This course is designed for completion, production and reservoir engineers of operating companies as well as service company personnel involved with planning, completion and operating wells and surface facilities.

Description

This short course will cover the fundamentals of Artificial intelligence and Data Mining and will provide the theoretical background for its most used components such as artificial neural networks, evolutionary computing, and fuzzy logic. The short course will then provide some insight on the type of problems that can be solved using the artificial intelligence techniques and the types of problems that are not suited for AI. The last part of the short course will be devoted to actual application of these techniques in production optimization.

Artificial Intelligence is a collection of several analytical tools that attempts to mimic life. AI tools are being used in many commercial products. They are an integrated part of many new cars such as Honda and Mitsubishi. They are used to provide smooth rides in subway systems and prevent fraud in use of credit cards. They are extensively used in the financial market to predict chaotic stock market behavior, or optimize financial portfolios. Their application in oil and gas industry is fairly new. A handful of researchers and practitioners have concentrated their efforts to provide intelligent tools for the petroleum industry. Artificial intelligence tools have been used to Optimize Hydraulic Fracture Designs, Characterize oil and gas reservoirs, Optimize drilling operation, Interpret well logs, generate virtual magnetic resonance logs, select candidate wells for stimulation and predict post fracture deliverability.

Topics covered include the following:

- Artificial Intelligence & Data Mining; an over view
- Artificial Neural Networks
- Evolutionary Computing
- Fuzzy Logic
- Hybrid Intelligent Systems
- Field Applications & Hands on exercises
 - Optimization of Hydraulic Fracturing
 - Stimulation/Workover Candidate Selection
 - Intelligent Production Data Analysis for:
 - Optimization of infill locations
 - Optimization of underperformer wells
 - Virtual Multi-Phase Flow Metering
 - Developing Surrogate Models for Surface Facilities for Optimization and Bottle-neck Removing

Shahab D. Mohaghegh is professor of Petroleum & Natural Gas Engineering at West Virginia University and founder and president of Intelligent Solutions, Inc., the leading company in providing the oil and gas industry with solutions based on artificial intelligence & data mining (AI & DM).

With more than 16 years of experience, Dr. Mohaghegh has been a pioneer in the application of "AI & DM" in petroleum engineering, applying hybrid forms of neural networks, genetic algorithms and fuzzy logic to smart wells, smart completions, and smart fields as well as to drilling, completion, well stimulation, surface facility optimization, formation evaluation, seismic inversion, reservoir characterization, reservoir simulation and reservoir management.

He has published more than 100 technical papers during his career and has been a technical editor/reviewer for various SPE journals as well as other petroleum-related publications such as Journal of Petroleum Science and Engineering, Computers & Geosciences, Geophysics, and Energy & Fuels. His technical articles on the application of "AI & DM" in the oil and gas industry and their recent developments have appeared in the Distinguished Author Series of SPE's Journal of Petroleum Technology during September, October and November of 2000 as well as the April 2005. He is a SPE Distinguished Lecturer for 2007-2008.

He is the technical review chair for SPE Reservoir Evaluation and Engineering Journal 97-99, & 2007-present. He has also served as discussion leader and technical presenter in SPE forums and has served as a steering committee member in SPE Applied Technical Workshops. He has been a panelist in several international conference discussing topics related to "AI & DM" and smart fields.

Shahab D. Mohaghegh holds B.S. and M.S. degrees in Natural Gas Engineering from Texas A&I University and Ph.D. in Petroleum & Natural Gas Engineering from The Pennsylvania State University.