

SPE GCS Data Science Convention

Speaker Agenda's



Kim Pham, Assoc. Partner,
IBM Global Business Services

“Show me the Block - Thought Leadership on How Blockchain Can Address Upstream's Most Challenging Business Issue”

We've all heard the buzz on blockchain - the new darling of the innovative solutions, the disrupter of the digital revolution, the solution to cure all your business woes and solve world hunger. But really, what is blockchain? Why should I consider it? How will it impact me? Where should I begin? When is a good time to start? All great questions and in this forum, we will cover these questions and many more.

The talk outlines:

- What the business challenge are
- How blockchain can simplify the business process
- Where business can gain benefits and value
- Where other innovative solutions such as mobile apps, IOT, cognitive and cloud computing can enhance the blockchain solution
- How blockchain can integrate into SAP

We wrap up with how business can incorporate these uses cases into large integrated blockchain eco-systems and a roadmap in planning the blockchain strategy.



Dr. Richard Baraniuk,
Victor E. Cameron Professor,
Rice University

“Going off the deep end with deep learning”

A grand challenge in machine learning is the development of computational algorithms that match or outperform humans in perceptual inference tasks that are complicated by nuisance variation. For instance, visual object recognition involves the unknown object position, orientation, and scale in object recognition while speech recognition involves the unknown voice pronunciation, pitch, and speed. Recently, a new breed of deep learning algorithms have emerged for high-nuisance inference tasks that routinely yield pattern recognition systems with near- or super-human capabilities.

However, a coherent framework for understanding, analyzing, and synthesizing deep learning architectures has remained elusive. We make some progress in this direction by developing a new probabilistic framework for deep learning based on the Deep Rendering Model (DRM): a generative probabilistic model that explicitly captures latent nuisance variation. By relaxing the DRM's generative model to a discriminative one, we recover the inference computations in not only deep convolutional neural networks but also random decision forests, providing insights into their successes and shortcomings, a principled route to their improvement, and new avenues for exploration. (2016 NIPS paper: <https://goo.gl/kNcXG1>)



Pallav Sharma, Chief Scientist,
Tachyus

“Data Driven Modeling and Optimization of Oil and Gas Assets”

This talk describes a unique modeling approach termed Data Physics. Data Physics is the amalgamation of the state-of-the-art in machine learning and the same underlying physics present in reservoir simulators. These models can be created as efficiently as machine learning models, integrate all kinds of data, and can be evaluated orders of magnitude faster than full scale simulation models, and since they include similar underlying physics as simulators, they have good long term predictive capacity and can even be used to predict performance of new wells without any historical data. We present applications of Data Physics models to real steamflood and waterflood optimizations with thousands of wells, wherein, the injectant is redistributed to maximize/minimize multiple objectives. A significant increase in actual incremental oil production and reduction in operational cost is demonstrated.

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Prashant Mehrotra, *Senior Manager, Strategy, Accenture*

"Hydrocarbon Markets: Why Break Even When You Can Break Away?"

In an environment of uncertainty and prolonged commodity price pressures, O&G companies need to make tough choices about how and where they will compete. In the near term, every dollar of return will matter. So will investment agility. Hydrocarbon portfolios must be balanced to accommodate the accelerated pace of industry change and volatility. The stakes for O&G companies are sky high.

The good news is that advances in big data analytics help enable O&G companies to now understand asset economics at a granular level. We have developed a bottom-up hydrocarbon asset evaluation model which analyzes the risk and return attributes of every significant asset class and geography. This sort of tool helps O&G executives base their portfolio decisions on a comprehensive understanding of current and potential economics. Beyond optimizing decision-making in the near term, this type of model can help leaders quickly adjust their choices as the landscape shifts. We believe this capability—which we call dynamic, advanced analytics-driven portfolio management—will be critical for O&G companies looking to create value in the months and years ahead.



Dr. Liz Percak-Dennett, *Technology Director, Biota Technology*

"DNA Sequencing Technology's Fast Adoption in the O&G Industry; From Gut Microbiome to Hydrocarbon Reservoirs"

Biota Technology's mission is to deploy DNA sequencing to maximize reservoir economics. The application of DNA sequencing in the oil and gas industry provides operators with a non-invasive, high-resolution data source to track subsurface fluid movement by examining subsurface DNA originating from microbial communities within the subsurface. To date, this technology has been applied on over 400 wells by a majority of top US Shale producers in all major basins of North America including the Permian, Eagle Ford, and Bakken. Deployment of this technology has resulted in increased reservoir understanding including monitoring of drainage heights and well:well communication over time. This presentation will cover Subsurface DNA Diagnostics basics, field workflow, data analysis, and provide several case studies of practical applications in unconventional reservoirs.



Pedro Esteves Aranha, *Technology Advisor, Petrobras*

"Petrobras digital real time well construction operations and well design backbones"

We intend to show some applications in data science to support well design decisions and real time well constructions operations (drilling, completions and workover).

Recently were implemented in Petrobras a well design web portal in which we integrated most of our in house developed simulators and new developed apps. We will present some applications using artificial neural networks (ANNs) and Random forest based in historical data to define the drilling fluid properties to drill salt intervals without NPT or safety issues. In real time operations we intend to present some data science applications developed in our RTO system in which a wide range of sources were integrated such as: DCS (Drilling Control System), mudlogging and MWD/LWD cabins, BOP sensors, cementing units sensors, Well Stimulations Vessels, Pressure and Temperature sensors installed in wet Christmas trees or pressure downhole gauges (PDG).

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Patrick Rutty, Sr. Product
Manager, DrillingInfo

"Using Multivariate Nonlinear Statistics to Quantify the Impact of Well Spacing and Drilling & Completion Variables on Production"

How many wells should I plan in an undrilled unit? How much negative impact will a poor completion have in high quality reservoir rock? What drilling and completion parameters are required to deliver economic wells in Tier II rock? Engineers and geoscientists working in unconventional plays face questions like these virtually every day. This workflow-based talk will focus on using geologic, drilling, and completion data as input to a multivariate statistical analysis to predict EUR in the Middle Bakken in Mountrail County, North Dakota. In this way, we arrive at answers much richer than historically obtained from attempts to simplify the problem to a set of bivariate (crossplot) relationships.



Barry Zhang,
CEO, Quantico Energy
Solutions

"Artificial Intelligence for the Subsurface: Key Use Cases"

Digitalization has become a powerful driver of better performance and efficiencies in the Upstream. This has been made possible in large part by the combination of an extended, low commodity price environment along with wider deployments of IoT and artificial intelligence tools across the industry. These early but powerful deployments of AI have focused on areas such as condition monitoring and operational efficiencies. The next major step change in AI within the oil and gas industry will be driven by applications targeting the subsurface, which presents new challenges.

This presentation will address some of the unique challenges leveraging AI for the subsurface. What are the major use cases? How do we bridge statistics and implicit physics with explicit physics? Where do we find the right data? These obstacles require novel approaches for the data science community. For those oil and service companies who become well-versed in identifying the key subsurface use cases, their ability to drill wells and design completions with more accuracy and efficiency will deliver significant outperformance.



Andy Flowers, Director,
Advanced Analytics, Marathon
Oil

Setting up an advanced analytics group in upstream oil and gas requires careful consideration of strategy, competencies and management of expectations under the deluge of hype around machine learning, artificial intelligence and big data. Initiating a focus on solving engineering problems, balancing competencies between data science and petroleum engineering and geosciences, as well as gaining adoption are key challenges faced in value realization. A practical approach to creating analytics solutions with case histories will be outlined.



Pradeep Ashok, Senior
Research Scientist, University
of Texas, Austin

"Bridging the data analytics gap between Industry and Academia"

Traditionally students in the petroleum engineering departments are not taught data analysis techniques. As a result, they enter the workforce ill prepared for today's data driven performance improvements. At UT Austin, we started a program in 2014, where we built a real-time operating center and hired undergraduate students to work in the center, on actual drilling data. The student driven analysis of such data secured through non disclosure arrangements with operators has resulted in savings of more than \$50M. In the process, the students also developed an innovative storyboarding process that is extremely useful for analyzing "big data". To date more than 35 undergraduate students have taken part in this program. This talk will detail the results of this program in hopes of stimulating such initiatives in other universities.

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Troy Ruths, *CEO and Chief Data Scientist, Ruths Analytics and Innov.*

Troy Ruths received his BS in Computer Science from Washington University in St. Louis and a PhD in Computer Science with a specialization in Computational Biology, from Rice University. He has over 9 years of experience in data analysis of oil and gas applications and has managed the development and deployment of upstream-focused data analysis and visualization tools in 6 countries, representing shale gas, conventional oil, heavy oil, onshore, and deep offshore. He founded Ruths.ai in 2013 as a conversion from his independent consulting practice.

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