

DATA ANALYTICS STUDY GROUP

“Advance the oil and gas community's ability to meet the world's energy demands in a safe, environmentally responsible, and sustainable manner”

January 2020

Who are we ?

Data Analytics Study Group

Group of 25+ highly motivated individuals working in wide variety of fields within the energy industry with a common mission to upskill professionals in SPE GCS to take charge of leading change in energy industry

- Mission
 - Connect energy industry through data analytics
 - Highlight data analytics/ML/AI success stories and share best practices
 - Create platform for professionals and students to demonstrate their technical work and network with others

Webpage: <https://www.spegcs.org/study-groups/data-analytics-initiative/>

Best practices for virtual events

- Keep **yourself on mute when you are not talking** – you will be responsible for muting / un-muting yourself.
- Close all other apps (e.g., Outlook, browsers) not required for the event
- Minimize other devices or apps using your home network (e.g. Internet-based games, Netflix, etc.)
- If possible, set your camera at eye-level
- Look into the camera when you are speaking

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Machine learning challenge

- **Goal:** Provide a platform for professionals to showcase & hone their machine learning skill-sets to solve oil & gas related problems
- **Problem Statement:** Generation of sonic logs from other well-logs
- **Problem Description:**
 - ✓ Type: Supervised learning problem
 - ✓ Formulation: *Predict sonic log through a non-linear mapping between features (various well-logs)*
 - ❖ *Inputs: Available well logs (Porosity, Gamma Ray, Resistivity & Compressional slowness)*
 - ❖ *Output: DTSM*
 - ✓ Data Sponsor: TGS

Prizes!!!!

- Metrics Driven Award (RMSE – Root Mean Square Error)
 - First \$500
 - Second \$300
 - Third \$200
- Innovation Driven Award
 - Free data science convention pass (*tentatively scheduled for July 2021*)
- ***Based on SPEi regulations: only teams fully based in US/Canada are allowed to receive cash prizes***
- ***Teams from other countries will receive equivalent non-cash prizes***

ML Challenge Schedule

- **15th January 11:30 AM – 1:00 PM Kick off Session**
- 22nd January 12:00 Noon – 1:00 PM Data Engineering (Babak Akbari)
- 29th January 12:00 Noon – 1:00 PM Data Modeling (Sunil Garg/Anisha Kaul)
- 5th February 12:00 Noon – 1:00 PM ML Strategy & Parameter Tuning (Shivam Agarwal)
- **15th February 5:00 PM Final Code & Presentation DUE**
- **22nd February winners will be announced**

*** Time above are in Central Standard Time (CST)*

SPE Code of Conduct

SPE Professionals are to exhibit the highest standards of competency, honesty, integrity, and impartiality; and are fair and equitable; and accept a personal responsibility for adherence to applicable laws, the protection of the environment, and safeguarding the public welfare in their professional actions and behavior. These principles govern professional conduct in serving the interests of the public, clients, employers, colleagues, and the profession.

Please refer to the link for a detailed code of conduct <https://www.spe.org/en/about/professional-code-of-conduct/>

Rules of the competition

- Teams/individual participations are not supposed to represent their company/organization. People from same company can participate, but their participation will not imply the participation of the company.
- Min 1 & max 5 participants per team
- All tools used should be open source - No proprietary tools/libraries/software
- Accepted programming language are Python and R
- The exact run-time environment must be submitted with the code:
 - Major/Minor Version of Python/R
 - Version of each Python/R library
- Plagiarism check will be done on the code. Any plagiarism will lead to automatic disqualification of the team
- All code will be treated as open source and needs to be released to GITHUB

Participant Expectation

- Join the [Slack Group](#)
 - Use the slack group for communication and forming a team if you are not a part of a team already
- Finish the [Signup Survey](#) by Monday 18th January by 1 PM CST
 - **Indicate your team name (15 characters)**
 - We will release the training data only to the respondents of survey

Data Release Schedule

- **15th January:** Well log files will be released shortly after the survey
- **29th January:** 10 well logs data will be released for testing purposes and leaderboard
- **12th February:** Complete testing dataset (20 well logs data) will be released

Leaderboard Guidelines

- Teams are expected to submit results in an excel file (Team_Name_Date.xls) that includes the prediction of their models vs. actual test data
- Organizers will provide feedback on RMSE errors
 - **1st February:** First Leaderboard
 - **7th February:** Second Leaderboard
 - **14th February:** Final Leaderboard
- Final Submission (code, excel file with results, video presentation)

Code & Presentation guidelines

- **Final Code**

- Clean modular code
- In-line, modular and project level documentation
- Language: Python & R
- Documentation: Python/R modules/packages used

- **Presentation**

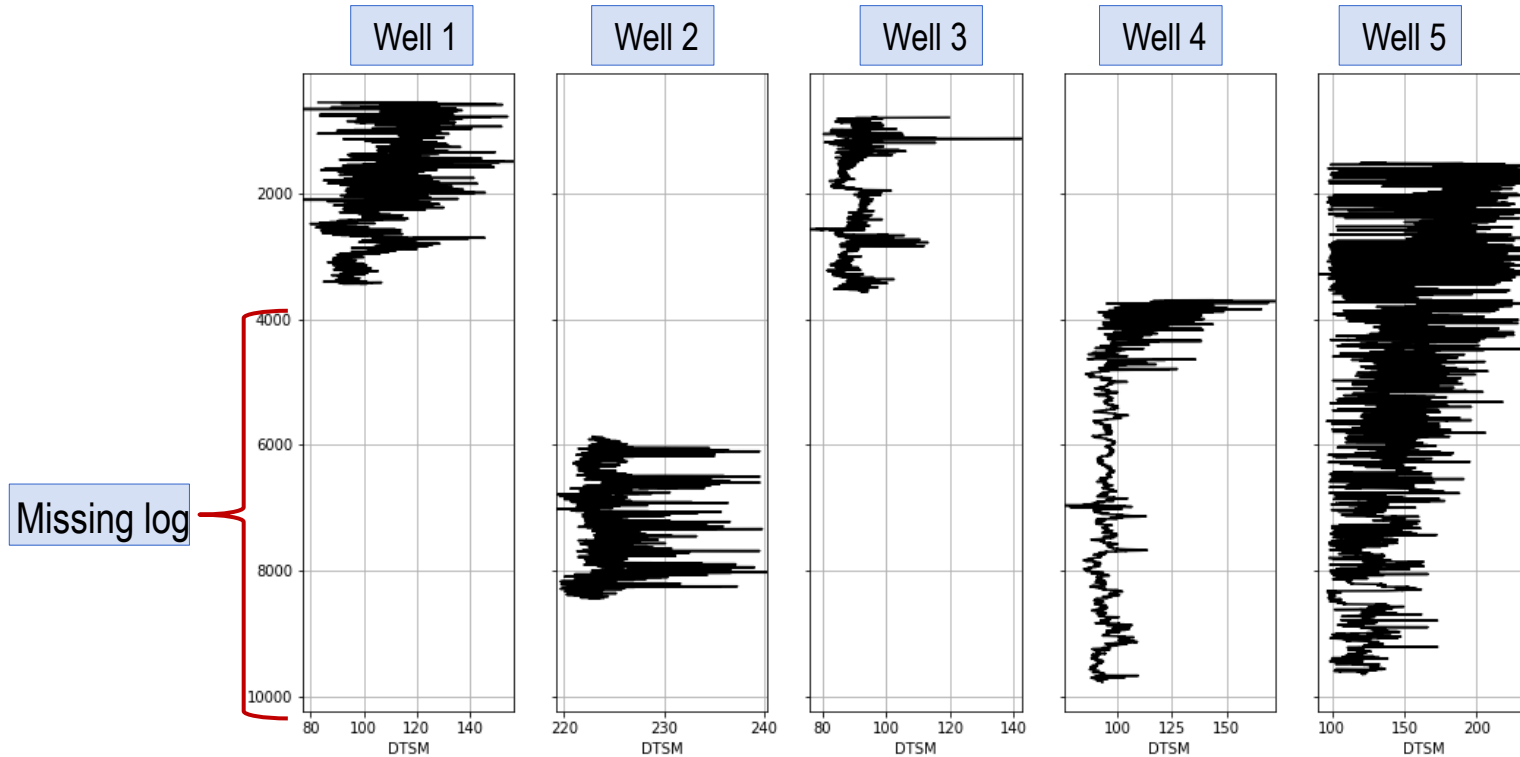
- 5 min of recorded video explaining your Machine Learning workflow
- 4 slides maximum
- SPE GCS PowerPoint format will be provided

Physics/Business value

- Sonic compressional (DTCO) and shear(DTSM) logs are used to measure seismic P and S-wave velocities of the formation near the well bore and used to
 1. Compute porosity,
 2. Pore pressure,
 3. Tie seismic to well data,
 4. Measure mechanical properties of rock near the wellbore.
- However, DTSM is only available in limited number of wells due to either the vintage of well or the high cost of the log acquisition
- DTSM is useful for amplitude variation with offset (AVO) analysis, V_p/V_s ratio calculation as a lithology indicator and to estimate the velocity anisotropy, and to build 3D velocity model in microseismic monitoring

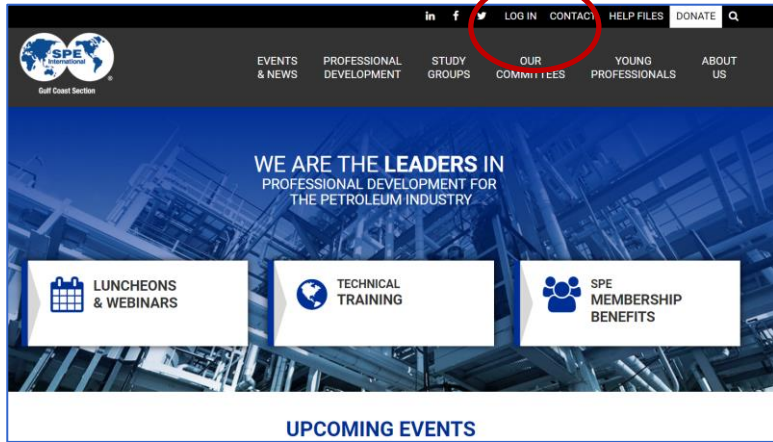
Applications of predicting DTSM

- Predicting missing DTSM for certain depths or in older wells



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