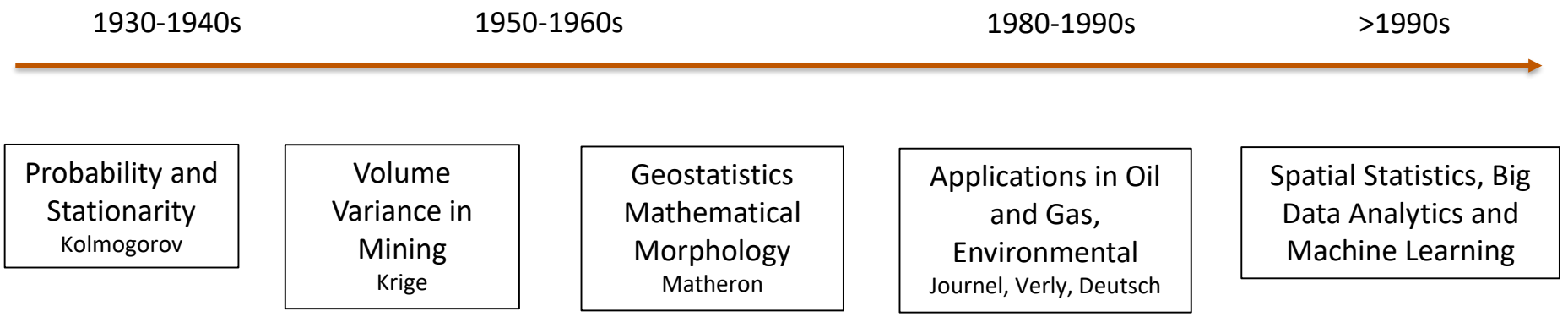
Energy A.I. 2023 Hackathon

Michael Pyrcz and John Foster
Energy A.I. 2021 Hackathon Hosts
Hildebrand Department of Petroleum and Geosystems Engineering

Petroleum / Mining / Spatial Engineering and Science Leadership in the Fourth Paradigm

'We are the original data-driven science, we have been big data long before tech learned about big data!'



'Complicated, heterogeneous, sparsely sampled, vast systems with complicated physics and high value decisions.'

What is a hackathon?

'an event in which a large number of people meet to engage in collaborative computer programming.'

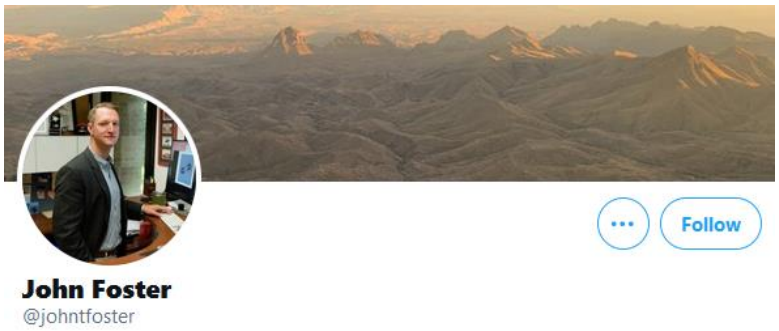
Dictionary.com

'The goal of a hackathon is to create functioning software or hardware by the end of the event'

Wikipedia

Energy A.I. Hackathon

Professor Michael Pyrcz (aka GeostatsGuy)
Hackathon Host



Professor John T. Foster
Hackathon Host

Elnara Rustamzade, PhD Candidate PGE
Hackathon Architect, Volunteer

Ruoyu Wang, PhD Candidate PGE
Hackathon Architect

The University of Texas at Austin
Hildebrand Department of Petroleum and Geosystems Engineering
Cockrell School of Engineering

Energy A.I. Hackathon

Hosted by PGE's Resident A.I. Experts
Dr. John Foster and **Dr. Michael Pyrcz**
@johntfoster @GeostatsGuy

2022 Energy A.I. 2nd Annual Hackathon, Hosted by Profs. Foster and Pyrcz

Broad Student Participation, Integrated with PGE Undergraduate and Graduate Students

21 Teams with >100 participants from Engineering, Geosciences and Natural Sciences at The University of Texas at Austin.

The Hackathon Team

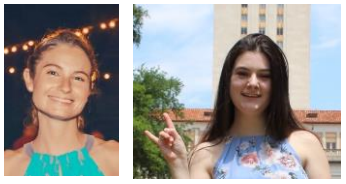

Prof. Michael Pyrcz (Host)


Prof. John Foster (Host)


Prof. Jon Olson (Advisor)


Elnara Rustamzade(Architect)

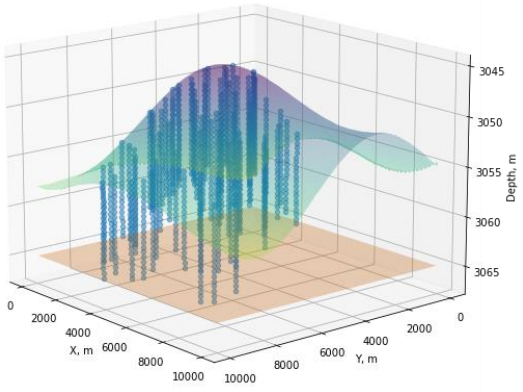

Ruoyu Wang (Architect)


Gabby Banales, Sam Rabinowitz and Trvor Oxley (Coordinators)

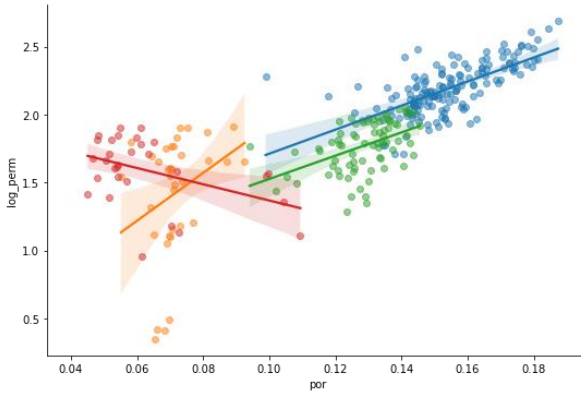
Sponsored by the Hildebrand Strategic Fund.

2021 Energy A.I. Hackathon, Hosted by Profs. Foster and Pyrcz

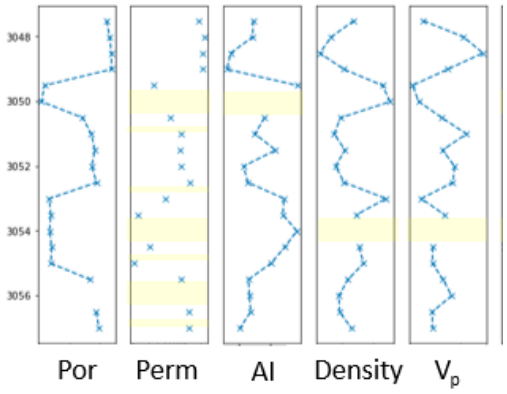
Hackathon Problem



Subsurface Machine Learning Challenge



Spatial, Multivariate Data Analytics

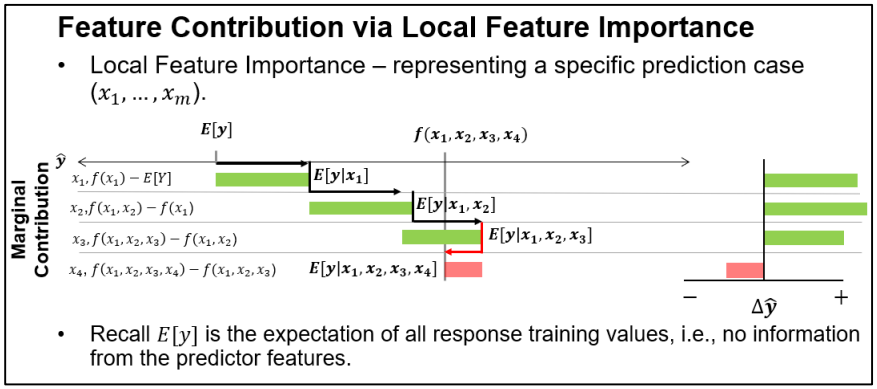


Feature Imputation and Engineering

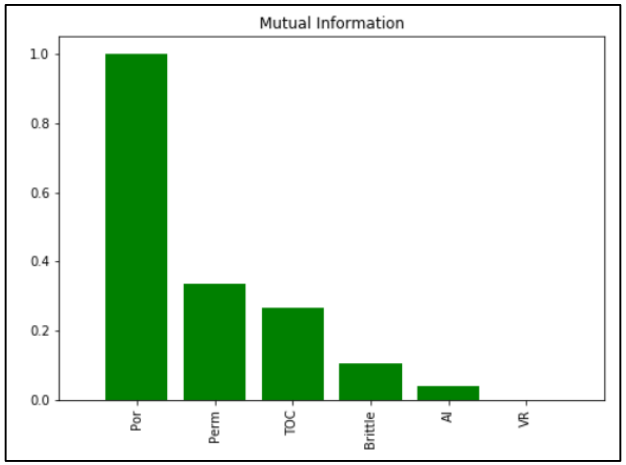
Build a data science solution for a very difficult multivariate, spatiotemporal dataset.

2023 Energy A.I. Hackathon, Hosted by Profs. Foster and Pyrcz

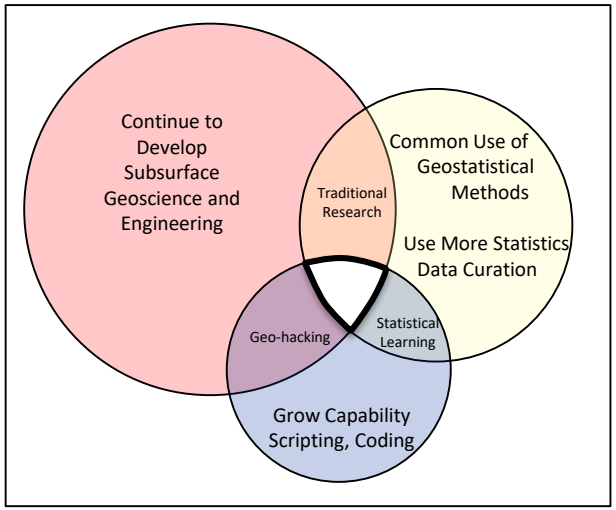
½-Day Workshop, Training on Data Science, Feature Engineering and Machine Learning



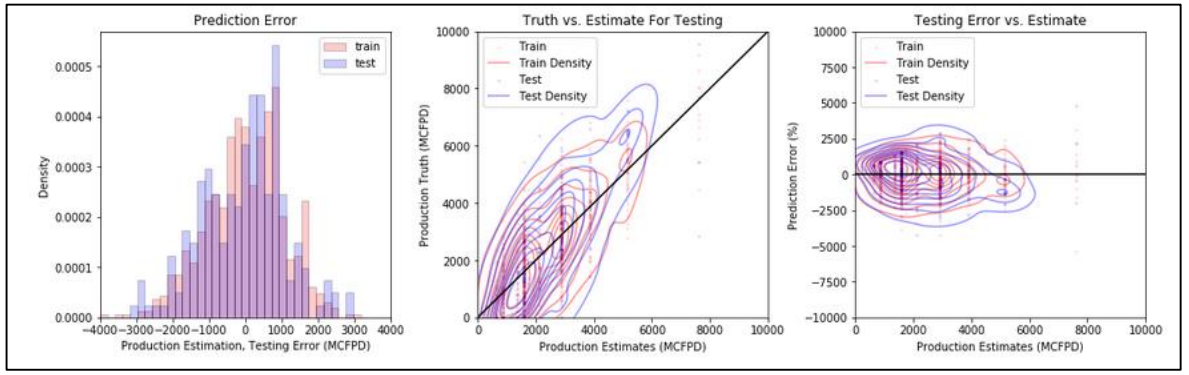
Shapley value for local and global feature importance



Mutual information from information theory for feature importance



Expanding engineering operational competency.



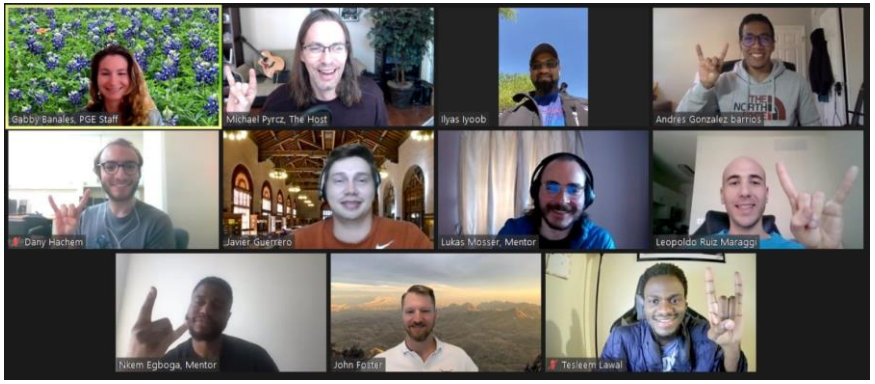
Model hyperparameter tuning and model accuracy and uncertainty checking.

2021 Energy A.I. Hackathon, Hosted by Profs. Foster and Pyrcz

1.5-Day Working Sessions with Expert Industry Mentors and Profs. Pyrcz and Foster

Sarah McDonnell - Chevron
Matthias Imhoff - ExxonMobil
Amy Rueve - Pioneer
Alireza Haghighat – S&P Global
Fabien Laguier - Chevron
Alena Grechishnikova - Chevron
Shane Prochnow – Chevron
Thatcher Thornberry – BP
…

Fabien Laugier and Lukas Mosser join to mentor the Hackathon teams.



Ilya Iyood, Nkem Egboga and Lukas Mosser join to mentor the Hackathon teams.

Zoltan Sylvester, Alireza Haghighat and Fabien Laugier join to mentor the Hackathon teams.

Strong mentor and student feedback.

2021 Energy A.I. Hackathon, Hosted by Profs. Foster and Pyrcz

0.5-Day Presentations, Judging and Awards

Graham Ganssle - Expero
Kumar Lakshmipathi – Amazon AWS
Sarita Salunke - BP

Ben Amaba – IBM
Jesse Pisel – UT Natural Sciences, Energy Analytics
David Holmes – Dell Technologies

The Energy A.I. Judges, industry and tech leaders .

Team Names	MSE Rank	Goodness Rank	Pres. Rank	Code Rank	Overall Rank
The_Roaring_Kitties	3	1	6	2	1
High-Risk-Low-Return	1	4	1	8	2
MOAR-Drilling	5	5	4	1	3
SpectralTeam	2	12	3	4	4
BAY	10	2	8	3	5
the_three_muscovites	8	10	2	7	6
NaN	4	9	10	6	7
ANTICLINE	9	7	9	5	8
HARRR	7	6	12	11	9
darcy-analytics	11	11	5	9	9
Smart-horns	12	8	7	12	11
Github_Heroes	6	12	11	10	11
Carpe-datum	13	3	13	13	13

Automated on the cloud Hackathon team scoring.

Projects scored for prediction accuracy, uncertainty model goodness, code deployability, and communication to management!

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Dr. John Foster and **Dr. Michael Pyrcz**
@johntfoster @GeostatsGuy

The Hildebrand Department of Petroleum and Geosystems Engineering invites you to in on an Energy A.I. Hackathon. Students will form teams and work together to solve an energy challenge with data analytics and machine learning in Python. Open to all UT Austin students to participate.

Schedule – In Person on the 40 acres:

Friday January 13th – team registration deadline
Friday Evening January 20th – ½ day workshop and problem introduction
Saturday All Day January 21st – 1 day working, initial prototypes, testing
Sunday All Day January 22nd – ½ day finalize workflows, presentation building and ½ day presentations, judging and awards

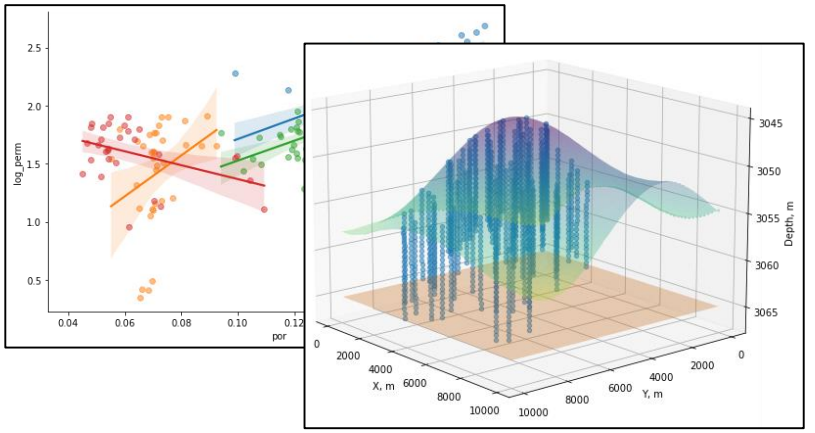
Teams:

Register **teams of 3-4**, which can include students from other departments and schools (UT EID required), but one student must be a UT PGE student and at least 1 undergraduate student per team.

Awards:

$5,000 for first place, $2,500 for second place, $1,000 for third place and $500 for fourth place teams.

To learn more, contact the hackathon hosts:
Dr. Michael Pyrcz (mpyrcz@austin.utexas.ede) and
Dr. John Foster (jfoster@austin.utexas.edu).



Spatiotemporal, Multivariate Machine Learning Challenge

Some of the expert Judges and Mentors at Energy AI 2022.

Some of the > 100 participants from 21 teams at Energy AI 2022.

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The Hackathon Challenge / Hints:

Domain Expertise
Integrated Subsurface Energy Problem

Data Volume
Sparsely Sampled, Heterogeneous

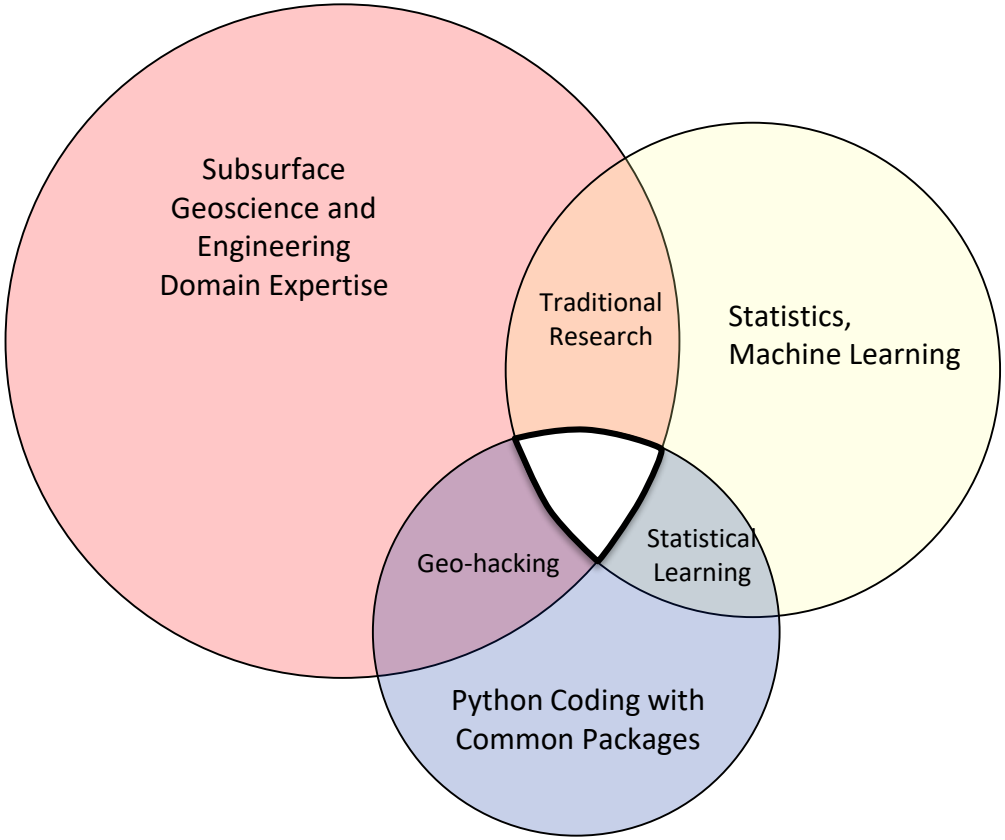
Workflow Complexity
Will require a multistep workflow.

Data Veracity
Uncertainty, error and biases.

Data Variety
Variety of types and scales.

The Hackathon Challenge / Hints:

Integrated Teams



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We are looking forward to a great event.