Energy A.I. Hackathon Introduction

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

Dr. Jon Olson
Sponsor and Advisor
Chair of the Hildebrand Department of Petroleum and Geosystems Engineering

Honggeun Jo and Mingyuan Yang
Hackathon Architects and Mentors, Graduate students in PGE

Gabby Banales and Sara Hernando
Coordinators

Appreciation

Appreciation to the student participants, the hackers!

Thank you for your enthusiasm!

Appreciation

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

Hildebrand Seed Fund Sponsorship

Professor Jon Olson
PGE Chair
Strong support and engagement

Gabby Banales
Organizing, Student Engagement

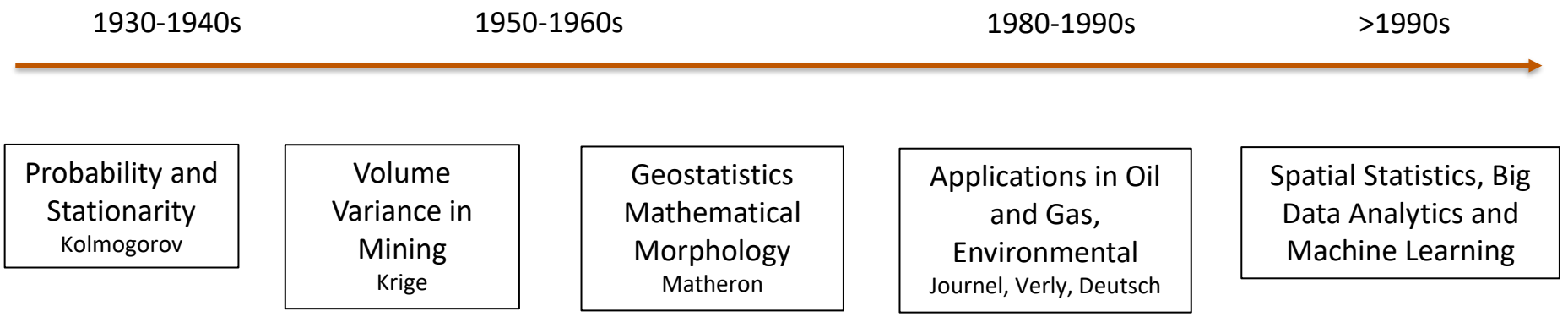
Sara Hernando
Organizing, Student Engagement

Welcome Message

Professor Jon Olson
Chair of the 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.'

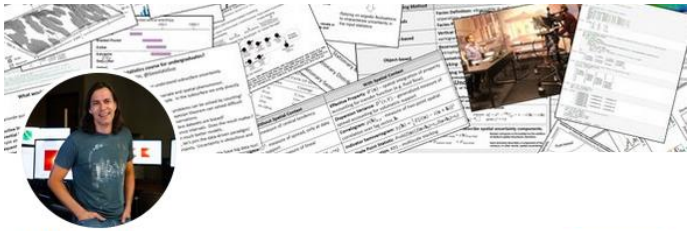
Dictionary.com

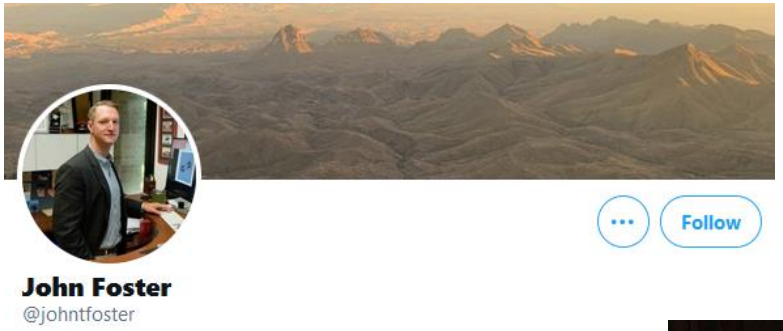
'The goal of a hackathon is to create functioning software or hardware by the end of the event'

Wikipedia

Who's Running this Show?

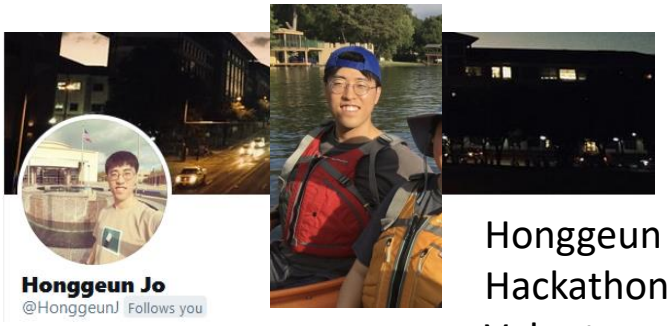
Professor Michael Pyrcz (aka GeostatsGuy)
Hackathon Host





Professor John T. Foster
Hackathon Host

Mingyuan Yang, PhD Candidate PGE
Hackathon Architect, Mentor



Honggeun Jo, PhD Candidate PGE
Hackathon Architect, Mentor, Volunteer

Gabby Banales
Coordinator

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

Mentors

Lukas Mosser — EARTH SCIENCE ANALYTICS

Fabian Laugier — Chevron

Zoltan Sylvester — Bureau of Economic Geology

Shane Prochnow — Chevron

Matthias Imhof — ExxonMobil

Obiajulu Isebor — bp

Chiranth Hedge — amazon

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

Nkem Egboga — sparkcognition

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

Michael Harty — OXY

Alireza Haghighat — IHS Markit

Energy A.I. Hackathon

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

Judges

Ben Amaba
CTO Cloud & Cognition

Graham Ganssle
Head of Data Science

David Holmes
CTO Energy

Kumar Lakshmipathi
Principal Architect

Jesse Pisel
Professor of Practice,
Energy Analytics

Sarita Salunke
Team Leader

Who is Here to Build?

21 Teams, from UT Austin Cockrell, Jackson and Natural Sciences

404 Not Found
Fooled by Randomness
Anticline
BAY
Carpe Datum
Darcy Analytics
GitHub Heroes
HARRR
hatodogmen
Low Risk High Return
Moar Drilling
NaN
PetroGeoElectric
PumpJack Inc.
Sherlock H.
smarthorns
Spectral Team
The 4 locos
The Roaring Kitties
The Three Muscovites
Yolo

Petroleum and Geosystems Engineering, Operations Research, Mechanical Engineering, Geological Sciences, Materials Science Engineering, Electrical and Computer Engineering, Data Science, Computer Science, Aerospace Engineering, Mathematics,

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

The Plan of 30,000 ft

Apply Data-driven Solutions with Data Analytics and Machine Learning

Schedule:

April 10th
Attend 1-day Workshop With Dr. Foster and Pyrcz on data analytics and machine learning

April 12-16th
Teams working on their projects independently.

April 18th
Teams preparing final presentations, presentations, judging and awards.

Mar. 26th
Register your team

April 11th
Teams working with available expert mentors and mentoring sessions.

April 17th
Teams working with available expert mentors and mentoring sessions

Enhance Learning

Promote collaboration & data-driven science

Inspire Innovation

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. No more than 1 graduate student per team.

Awards:

Winners of the A.I. Hackathon will be awarded bragging rights and $5,000 for first place, $2,500for second place, $1,000 for third place and $500 for fourth place teams.

The Hackathon Rules

Produce this by Noon April 18th:

1. Well-documented Python workflow in a Jupyter Notebook
2. Results as a .cvs DataFrame with estimates and realizations for your uncertainty model
3. Short presentation with executive summary, goals workflow choices and defense, results and discussion. Every team member presents.

Participation: All team members contribute to the above products. There are various roles! Participate in sessions.

Coding: Use only open source and methods / workflows developed by during the hackathon. Provide code for testing and scoring. All code in Python, Jupyter Notebook. **Readable code!**

The Hackathon Rules

Participate in the Scheduled Workshops and Working Sessions

Treat All other Hackers, Hosts, Mentors, Judges, Coordinators with the utmost respect.

The data has been sanitized. Do not attempt to hack the source!

Cite all code used from other sources in your workflows.
Pyrcz, M.J. (2020) GeostatsPy 0.0.19 [Source code]. https://github.com/GeostatsGuy/GeostatsPy

Work Hard, Learn and Have Fun!

The Hackathon Team Scoring

Results: 50% - Results Matter!

- Average of rank transform of accuracy error measure and uncertainty model goodness over all groups.

Workflow: 25% - Others Must Understand our Work for Adoption!

- Scoring metrics: readable code, efficient code, documentation of steps

Presentation: 25% - and We Must Be Able to Communicate Our Work!

- Executive summary, project goals, workflow description, results and discussion, finish on time

Use the provided templates for results, workflow and presentation. Follow the submission guidelines and submit on time.

The Plan for Today's Workshop

DAY 1 / April 10th - Energy A.I. Hackathon 2021 Workshop Schedule

8 am – 8:15 am: Hackathon Welcome, Introduction and Review Plan and Rules, Prof. Olson / Prof. Pyrcz

8:15-10 am: Essential Energy Data Science, Numpy, Pandas, Git - Prof. Foster

10 – 11:30 am: Feature Importance, Engineering and Selection, Multivariate Analysis and Shapley Values Prof. Pyrcz

11:30 am – 12:30 am: Lunch Break

12:30 – 1:30 pm: Machine Learning Basics, Train and Tune Overview of Methods - Prof. Pyrcz

1:30 – 2:30 pm: Machine Learning in Python, scikit-learn and TensorFlow Packages – Prof. Foster

2:30 – 3:30: Model QC, Uncertainty Modeling and Checking – Prof. Pyrcz

3:30 – 4:30: Introduce the Energy A.I. Hackathon Problem and Mystery Data Set – Prof. Pyrcz / Prof. Foster

4:30 - : Teams Break-out for Initial Data Review and Planning

Energy A.I. Hackathon

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

We are looking forward to a great event.