Energy A.I. 2025
1st Annual High School Hackathon Introduction

Dr. Michael Pyrcz and Dr. John Foster
Energy A.I. 2021-2025 Hackathon Hosts
Hildebrand Department of Petroleum and Geosystems Engineering

Dr. Matt Balhoff
Sponsor and Advisor
Chair of the Hildebrand Department of Petroleum and Geosystems Engineering

Appreciation

Appreciation to the student participants, the hackers!

Thank you for your enthusiasm!

None of this would be possible without our sponsors. Thank you for supporting Engineering Data Science Education!

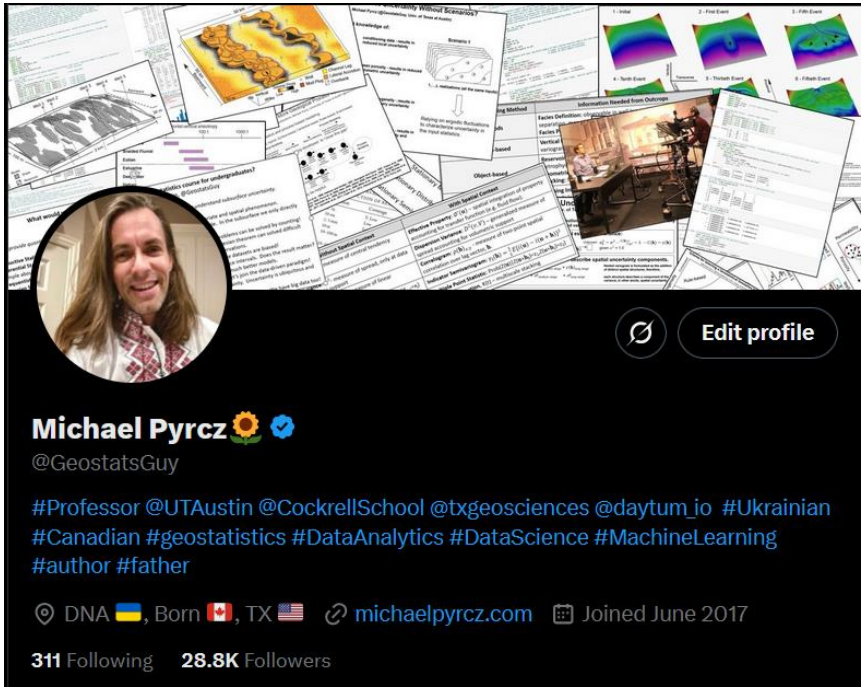
Thank You to Our Sponsors

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

The University of Texas at Austin
Cockrell School of Engineering

Who's Running this Show?

Professor Michael Pyrcz (aka GeostatsGuy)
Hackathon Host
Department of Petroleum and Geosystems Engineering
Department of Eart and Planetary Sciences



Professor John T. Foster
Hackathon Host
Department of Petroleum and Geosystems Engineering
Department of Aerospace and Engineering Mechanics

Appreciation

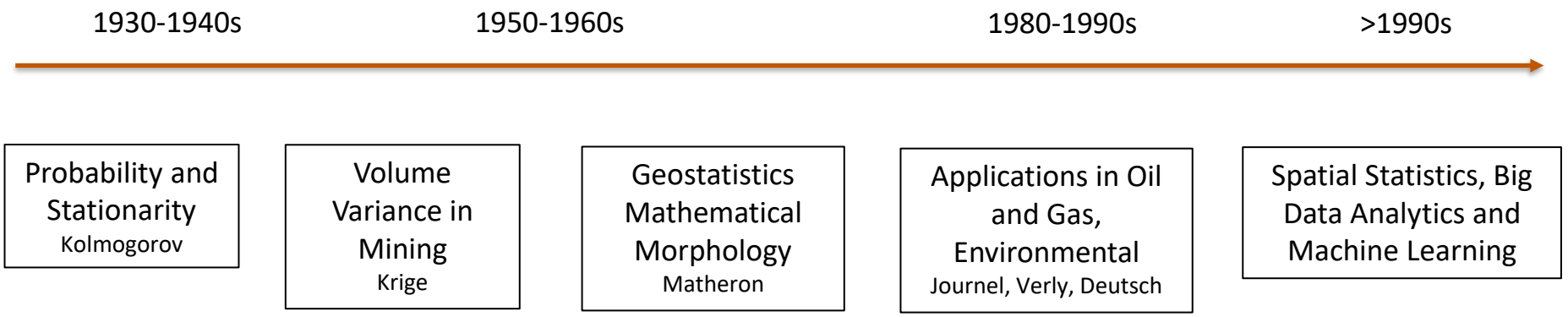
Professor Matt Balhoff
PGE Chair
Strong support and engagement

Kiersten Fernandez
Senior Program Coodinator

Undergraduate student counselors from Cockrell School of 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

The Hackathon Rules

Submit to GitHub by 9:30 noon, Wednesday June 25th:

1. Well-documented Python workflow in a Jupyter Notebook. **See template in resources folder.**
2. Results as a .cvs DataFrame, named: solution.csv, **use the file in data folder.**
3. Short presentation with executive summary, goals workflow choices and defense, results and discussion. **Novel data analytics and data viz!** Every team member participates in the presentation. **Use template in resources.**

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 during the hackathon. Provide code for testing and scoring. All code submitted in Jupyter Notebook. **Readable code!**

The Hackathon Rules

Our academic staff and counselors are working hard during long days!

- **Please let them know that we appreciate. Please treat them with great respect.**

- **Let's all do house keeping, clean up and disposal of recycling and waste in your work area and general areas, as we go. Take out the trash.**

The Hackathon Rules

Participate in the Scheduled Workshops and Working Sessions

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

Use code from others, but cite all code used from other sources in your workflows and presentations, e.g. figure captions.

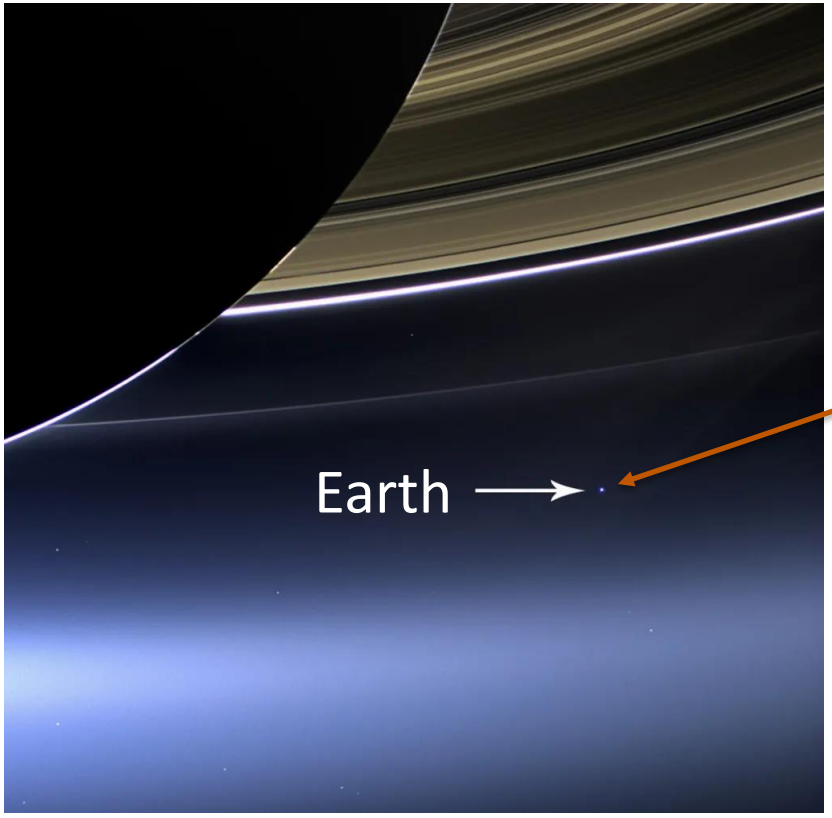
Pyrcz, M.J. (2020) GeostatsPy 0.0.19 [Source code]. https://github.com/GeostatsGuy/GeostatsPy
Foster, J.T., (2015) 1DPDpy 1.0 [source code]. http://dx.doi.org/10.5281/zenodo.15795

Work Hard, Learn and Have Fun!

The Hackathon Rules

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

We can provide the following general location of the data set.



Cassini photo of earth from a distance of 1.4 billion km with Saturn in foreground (April 12, 2017).
Photo from https://science.nasa.gov/resource/the-day-the-earth-smiled-sneak-preview-annotated/.

Hackathon Team Scoring

Results: 75% - Results, Results, Results!

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

Presentation: 20% - and We Must Be Able to Communicate Our Work!

- Executive summary, project goals, workflow description, results and discussion, **novel data analytics, and data and model viz**, finish on time

Workflow: 5% - Others Must Understand our Work for Adoption!

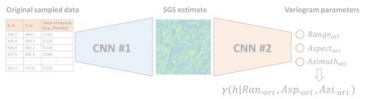
- Scoring metrics: readable code, efficient code, documentation of steps

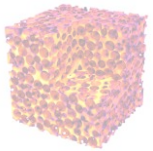
Use the provided templates for results, workflow and presentation. Follow the submission guidelines and submit on time.

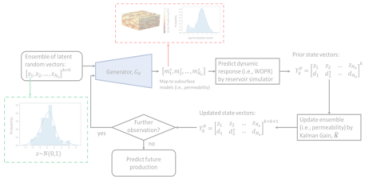
Energy A.I. Hackathon

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

The Plan at 30,000 ft







Hackathon Schedule

Schedule:

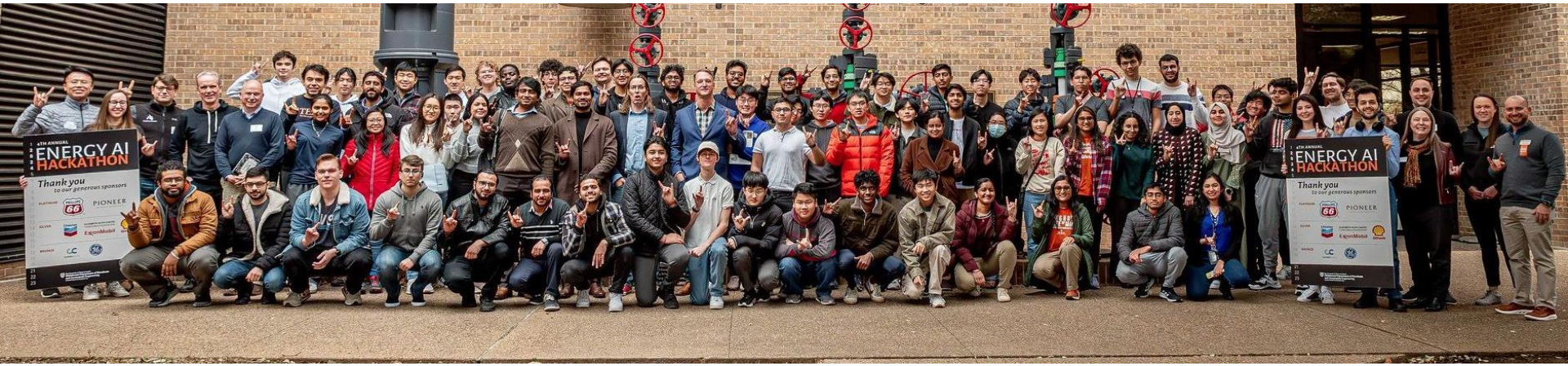
	Sunday	Monday	Tuesday	Wednesday	Thursday
Morning		Data Science in Python	Feature Selection	Prediction Models	Group Presentations
Afternoon			Cluster Analysis		
Evening	Welcome Introduction	Feature Imputation	Principal Components Analysis	Complete Submission	

The Plan for Session

1. **Lecture with theory and discussion**
2. **Demonstration with workflows, and interactive dashboards**
3. **Hands-on exercises with the mystery dataset**
4. **Documentation, building the presentation as we go**

The Plan for Hackathon

It is a lot of work, stick with it, it will be worth it!



Hackathon Finish photo from 2024.

Energy A.I. Hackathon

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

Top Teams from Last Year

Data Derricks, First Place

Faraz Rahman, Matthew Heichel, Nurul Hisham, Viren Govin, Saffat Reza

EnergPT, Second Place

Ahmed Merzoug, Erica Orona, Lei Liu, Mohamed Awad

Hackathon Guidance

1. **Build from provided Python codes.**

2. **Document as you go so Wednesday evening you can build your presentation and clean up your code for submission**

3. **Multitask with your team members, e.g., exploring data, workflow construction, plotting and presentation slides, etc.**

4. **Submit on time. Perfect is the enemy of good enough.**

Don't Jump to Complexity

Deep learning generated image of Professor Pyrcz.

Deep learning generated image of Professor Foster.

The Problem

Now to the GitHub repository.