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By:

APGCE ASIA PETROLEUM GEOSCIENCE CONFERENCE & EXHIBITION
'Asia's Premier Geoscience Event'

PETRONAS

GEOHACKATHON 2024

16 – 18 November 2024

Common Ground Bukit Bintang, Kuala Lumpur

Challenge Brief

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Background

Faults are cracks within the Earth's crust that may help provide conduits for hydrocarbon migration into a trap or stop hydrocarbon on its migration path. Horizons are distinct rock layers that represent different periods of deposition and help geologists track how hydrocarbons move through the subsurface. Understanding these faults are crucial for geologists in the oil and gas exploration.

In 3D seismic, faults are relatively easier to interpret compared to 2D seismic due to data continuity across an area of interest. Similarly, horizons are more confidently tracked in 3D seismic as the continuous data allows geologists to follow the same geological layer across the volume. For examples, in a producing field or exploration in a mature basin. In frontier exploration, geologists oftentimes are constrained with only 2D seismic in the form of discrete lines (inline and crossline).

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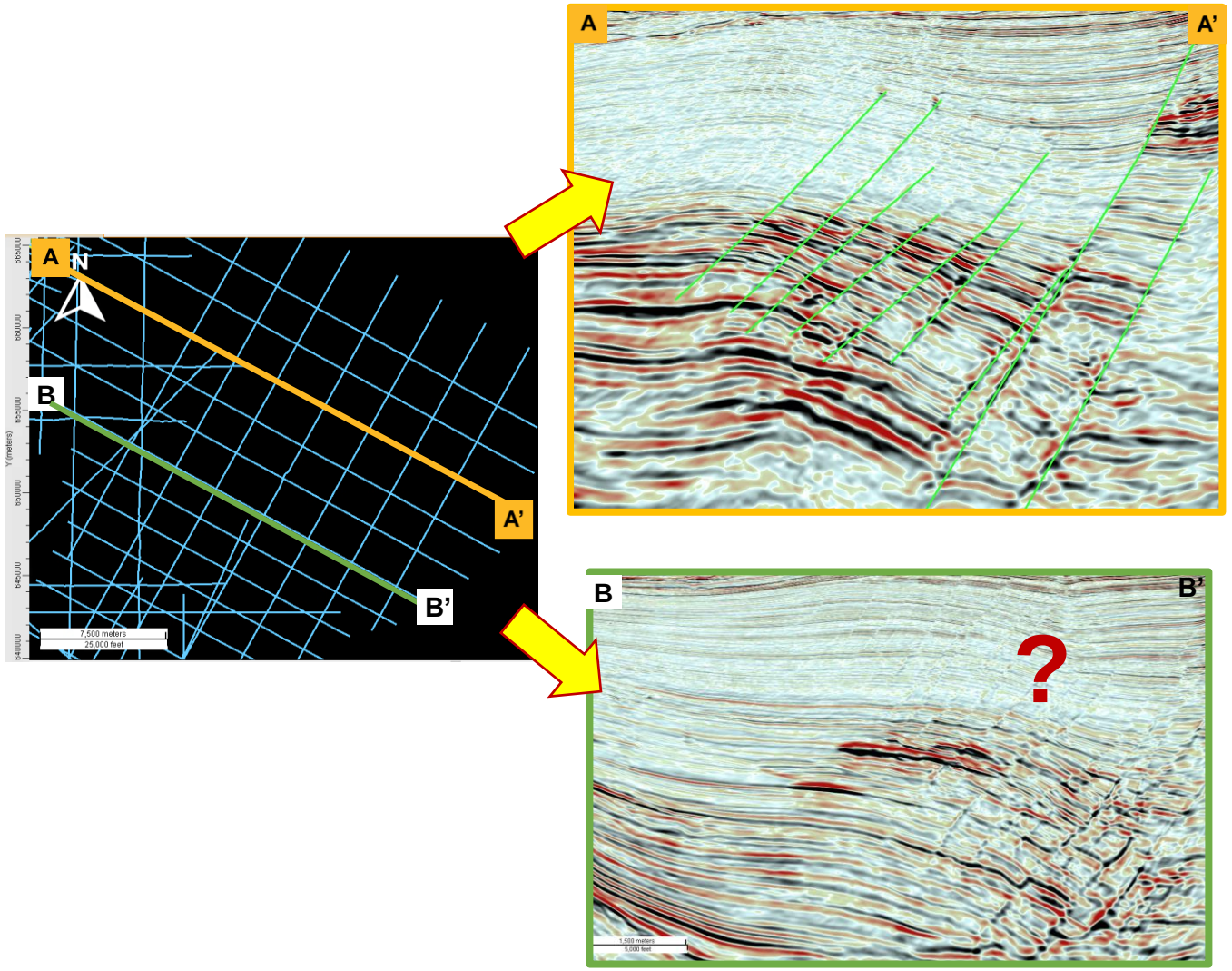
Challenges (cont)



Identifying and propagating the same fault across the 2D lines can become a challenge especially in a highly-faulted region.

Horizon tracking faces similar challenges, as discontinuous data makes it difficult to confidently correlate the same stratigraphic layer between widely-spaced 2D lines, particularly when the horizons are offset by faults or show variations in thickness and character.

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Challenges

- Challenge 1: build and train a computer vision model that can predict the propagation of faults across a given 2D seismic dataset.
- Challenge 2: build and train a computer vision model that can predict the propagation of horizons across a given 2D seismic dataset.

At the end of the 48 hours, you are given 10 minutes to present your solution to the judges. The final product will then be uploaded to and made available in a public repository.

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Data and compute provided

- Data will be seismics, faults and horizons exported to image files in advance. Utilizing seismic and faults / horizons in their native format for computer vision is an extremely laborious process, if we provided segy and fault / horizon files upfront, we might not have enough time to do interesting things in this hackathon!

- Azure Virtual Machines with GPU will be provided. You will need to bring your own device to access them. Our infrastructure team can assist you on-site.

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Data structure + download links

Each image is named after its inline, e.g. fault-1020.png, horizon-1020.png, seismic-1020.png

You will get to test your models on held-out data on Sun, late in the day! Further details to follow

- Faults: https://storage.googleapis.com/geohack2024/faults.zip
- Horizons: https://storage.googleapis.com/geohack2024/horizons.zip
- Seismics (split into 2):
  - https://storage.googleapis.com/geohack2024/seismics1.zip
  - https://storage.googleapis.com/geohack2024/seismics1.zip

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Tips

- Data is taken from a real field! Beware of real-world messiness in your data: missing data, incomplete data etc.
- Start by visualizing the data to get a sense of where to start!

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Thank you!