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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 2

Team 3 – TopDUG

Syahmi Adnan, Ariff Izzuddin, Lee Zhao Wei,
Fiqri Hakim, Faris Nordin

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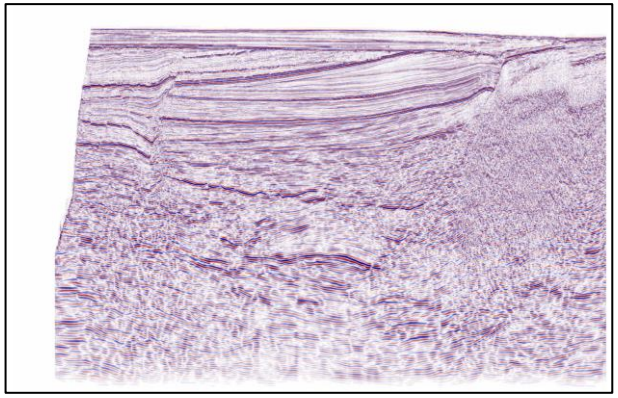
Introduction – TopDUG (Team 3)

- Syahmi Adnan - Geophysicist
- Ariff Izzuddin – Geophysicist
- Lee Zhao Wei – Geophysicist
- Fiqri Hakim – I.T. Engineer
- Faris Nordin – QI Geophysicist/Petrophysicist

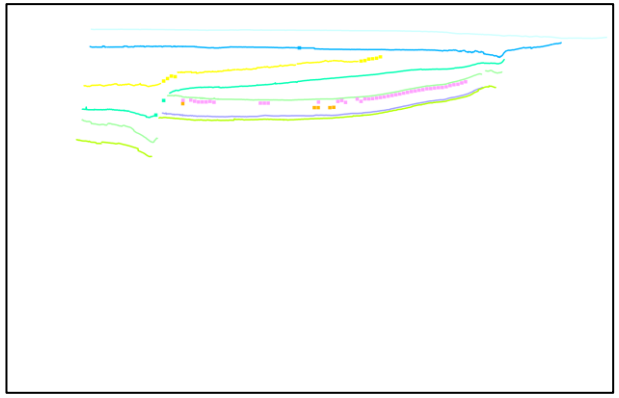
Introduction – Challenge

- Challenge 2:
  - Build and train a computer vision model that can predict the propagation of horizons across a given 2D seismic dataset.
- Data availability(examples given below):
  - Seismic lines
  - Fault diagrams
  - Horizons



Seismic: Line 1000

Fault diagram: Line 1000



Horizons: Line 1000

Observations/Limitations

- Small data extents (faults) -
  - Data may be imbalanced as compared to the seismic images.
  - The label faults might be underrepresented, which may lead to biased predictions and poor generalization.
  - Solvable through upsampling/downsampling, at the cost of increased runtime.
- Little geology variation across all the lines provided (data obtained over small area?), model trained might be biased to this kind of geology settings.
- Some conditioning in the horizons' label might help to give a better generalized model, for example stacking a certain increment of images to reduce outlier.
- Parameters may need further optimisation for more complex geologies – not a one size fits all solution

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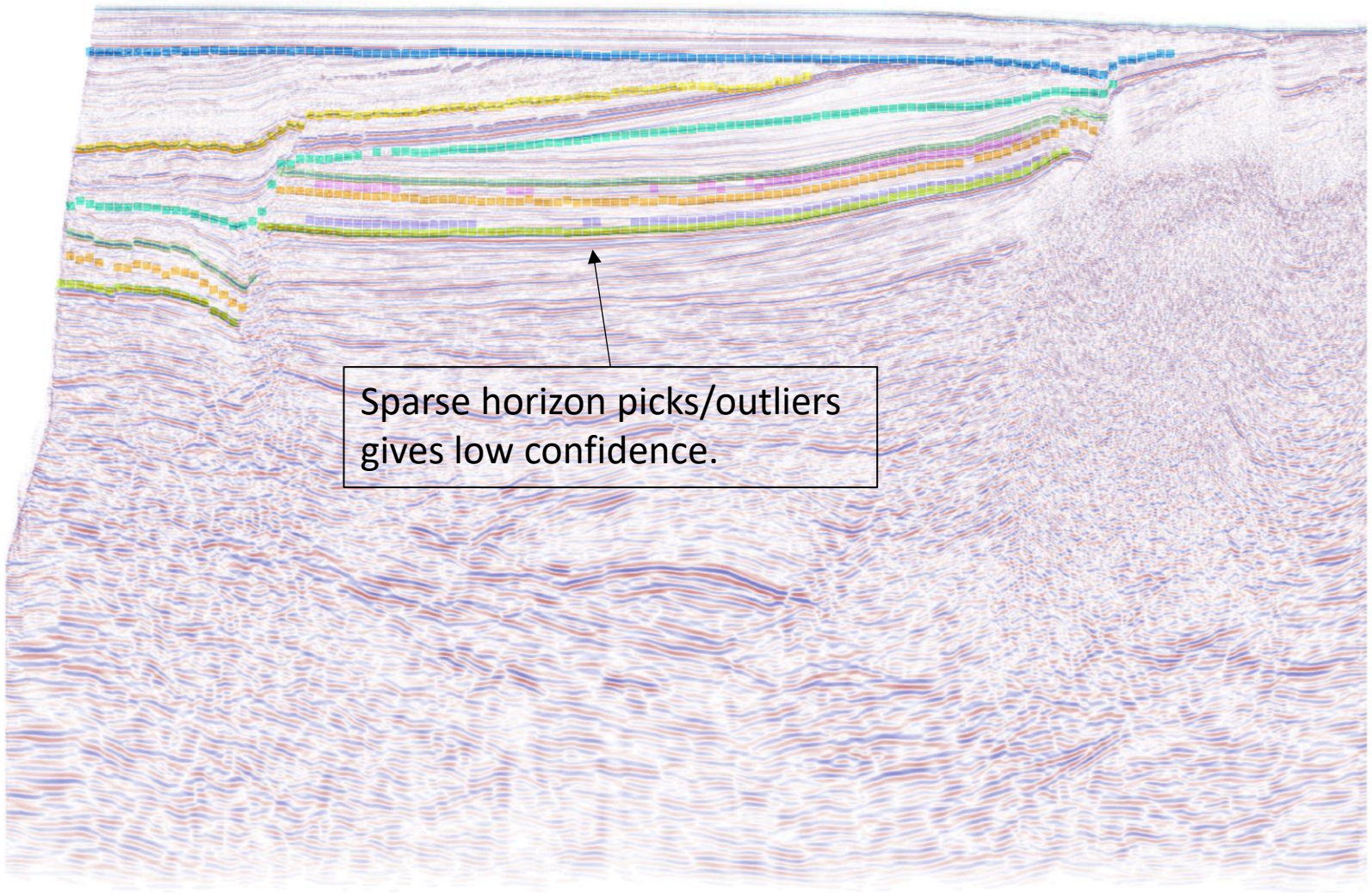
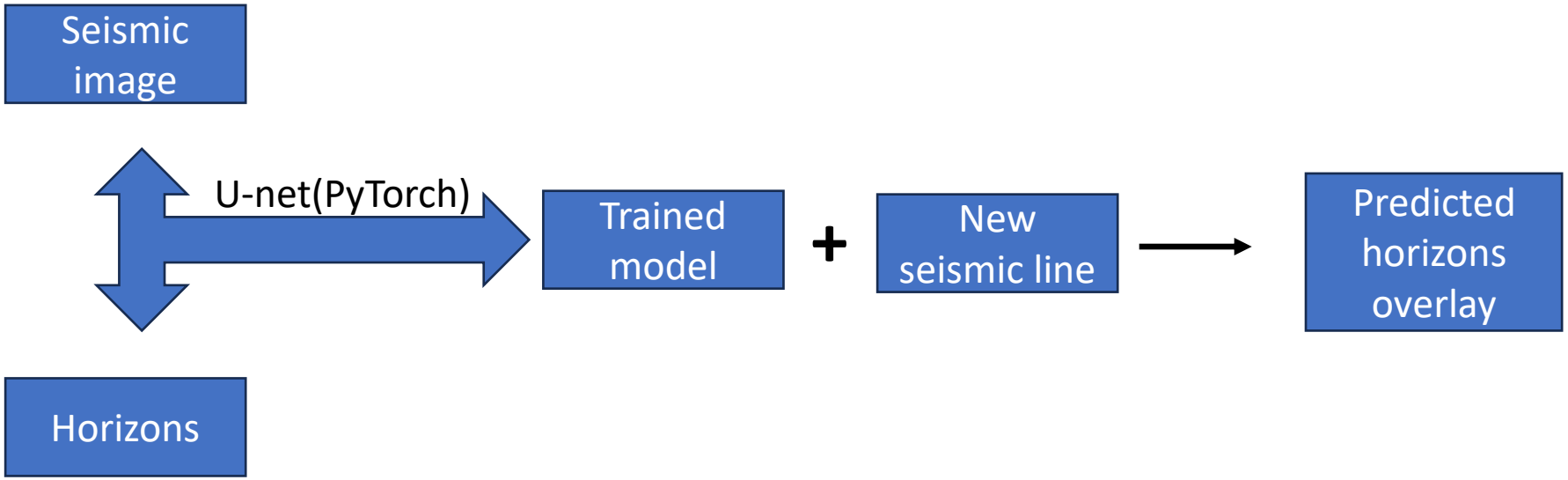
Input horizons overlying seismic – Line 1002

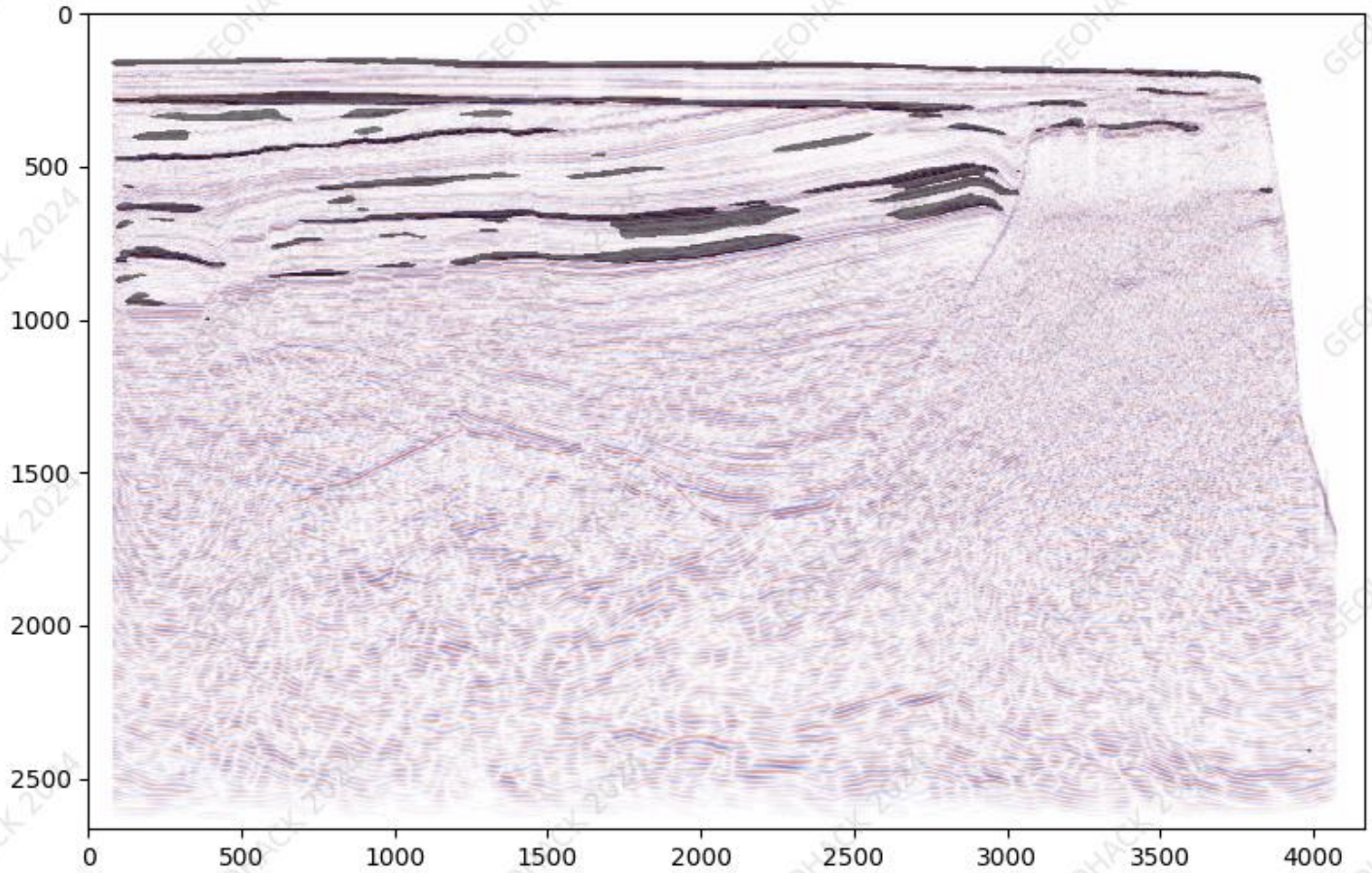


Methodology - Workflow

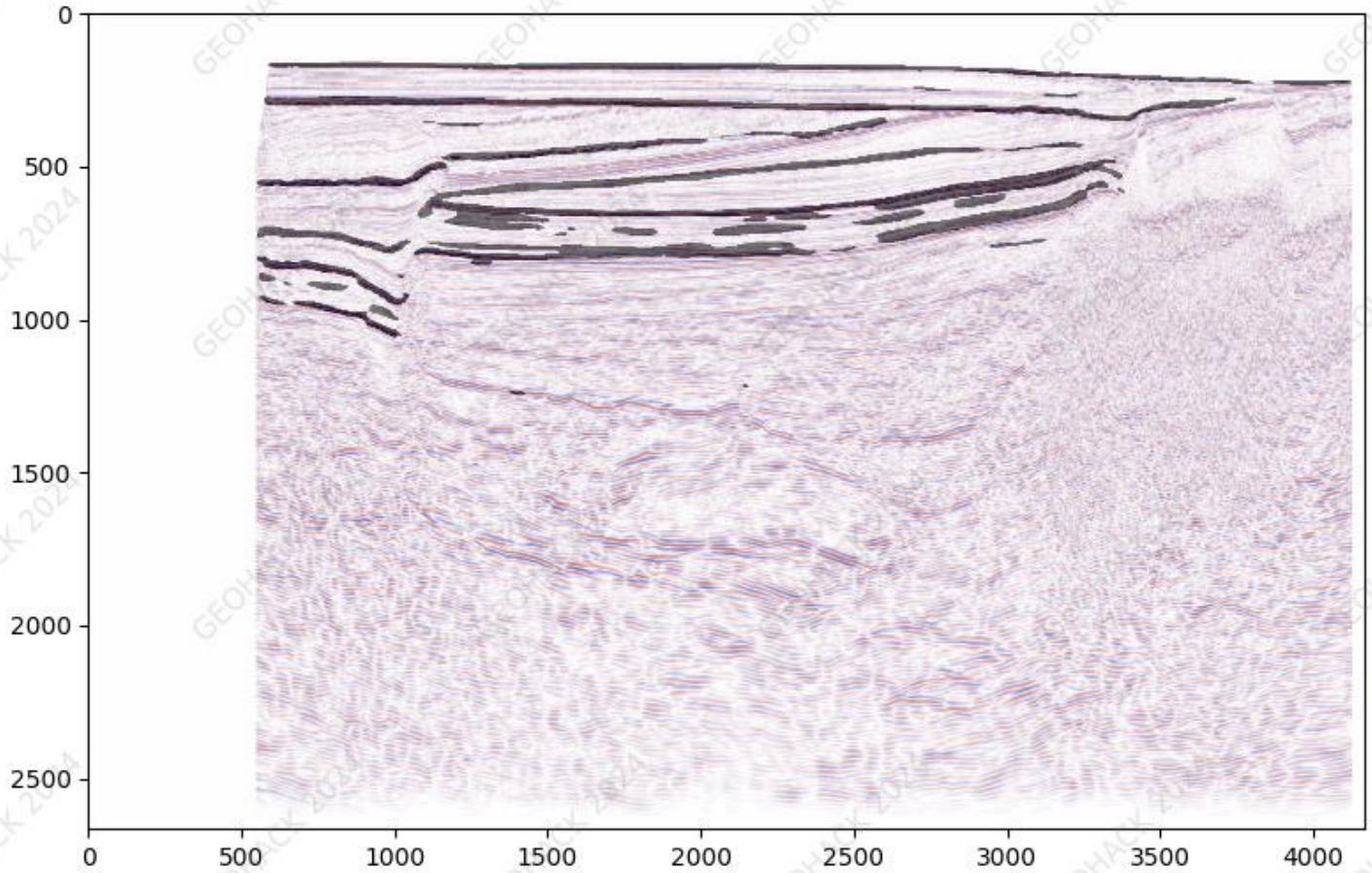


Workflow summary: Seismic image and horizons are fed into U-Net (PyTorch) to produce a model which allows prediction of geologically meaningful horizons from new 2D seismic sections.

Visualization of results on holdout data



Visualization of results on holdout data



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Thank you!