By:

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

PETRONAS

16 – 18 November 2024
Common Ground Bukit Bintang, Kuala Lumpur

Challenge 1 – Using Computer Vision to Predict Faults on 2D Seismic

Fault Handlers

Sponsored by:

ConocoPhillips
EQ enQuest
ERCE The expertise tomorrow needs
ExxonMobil
JX
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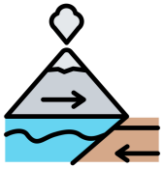
PROBLEM

Fault picking is laborious and repetitive



Leads to inaccurate or missed fault pics

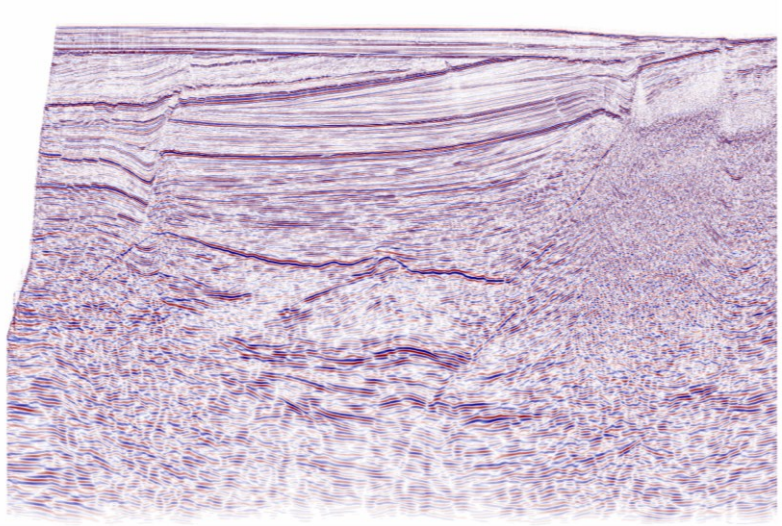
Existing solution are propriety and expensive

IDEAL SOLUTION

- ✓ Automated & accurate fault predictions
- ✓ Works with 2D data
- ✓ Human in the loop correction
- ✓ Open source and free

How Did We Attempt This - Data

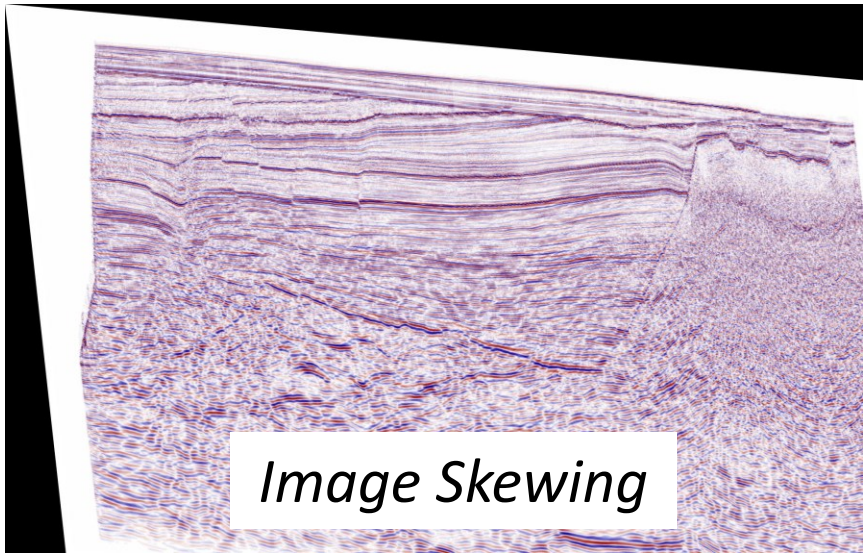
355 Seismic – Fault Label Image Pairs

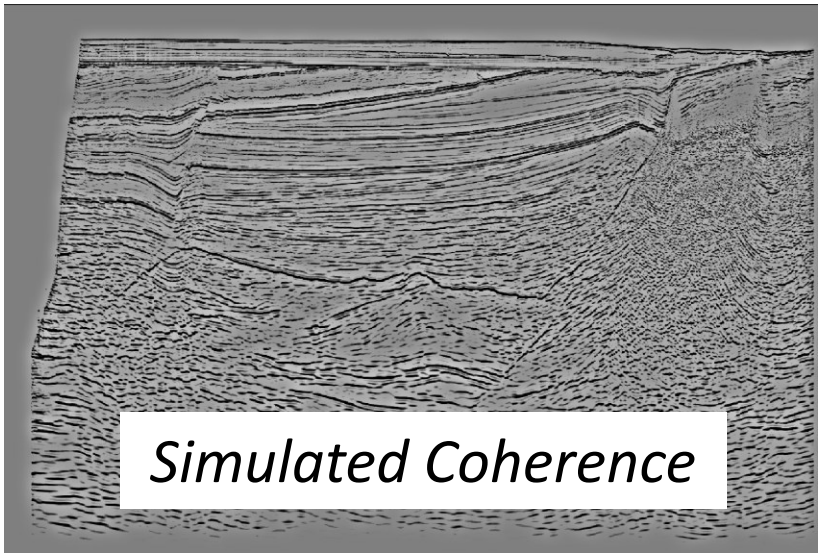


How Did We Attempt This – Pre-processing

Image Augmentation

Increased dataset from 355 to 925
160% increase!





Framing The Machine Learning Problem

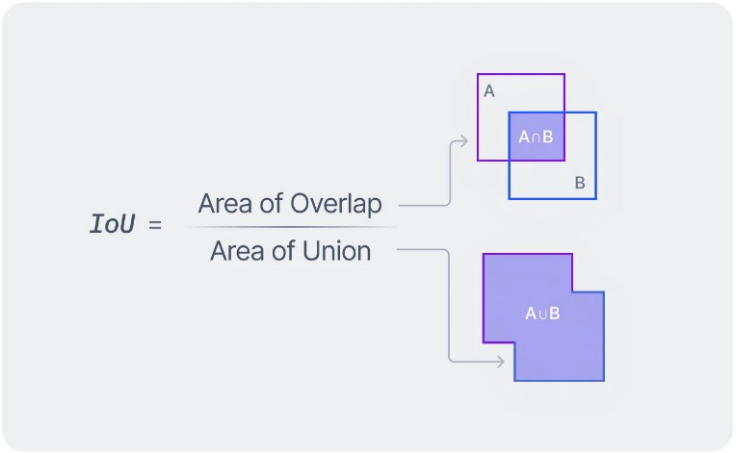
Computer Vision
Predict pixels on fault plane

YOLO family of models

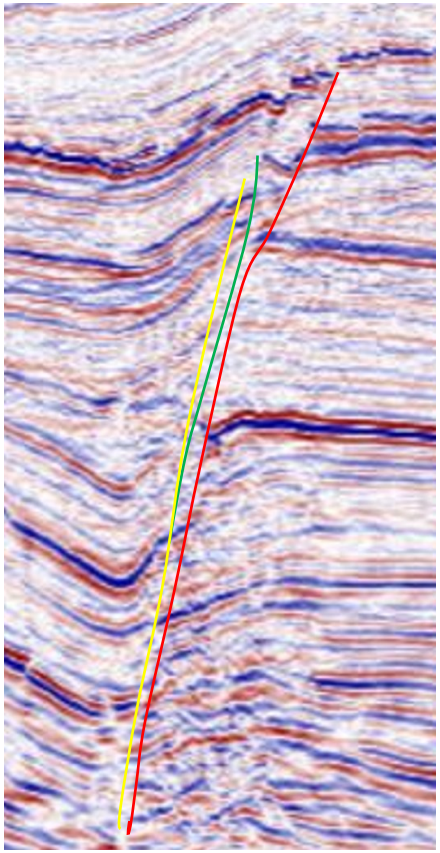
- Instance Segmentation over Semantic Segmentation
  - ✓ Normal Fault
  - ✓ Thrust Fault
  - ✓ …

Metric for Success – Which Model is the Winner?

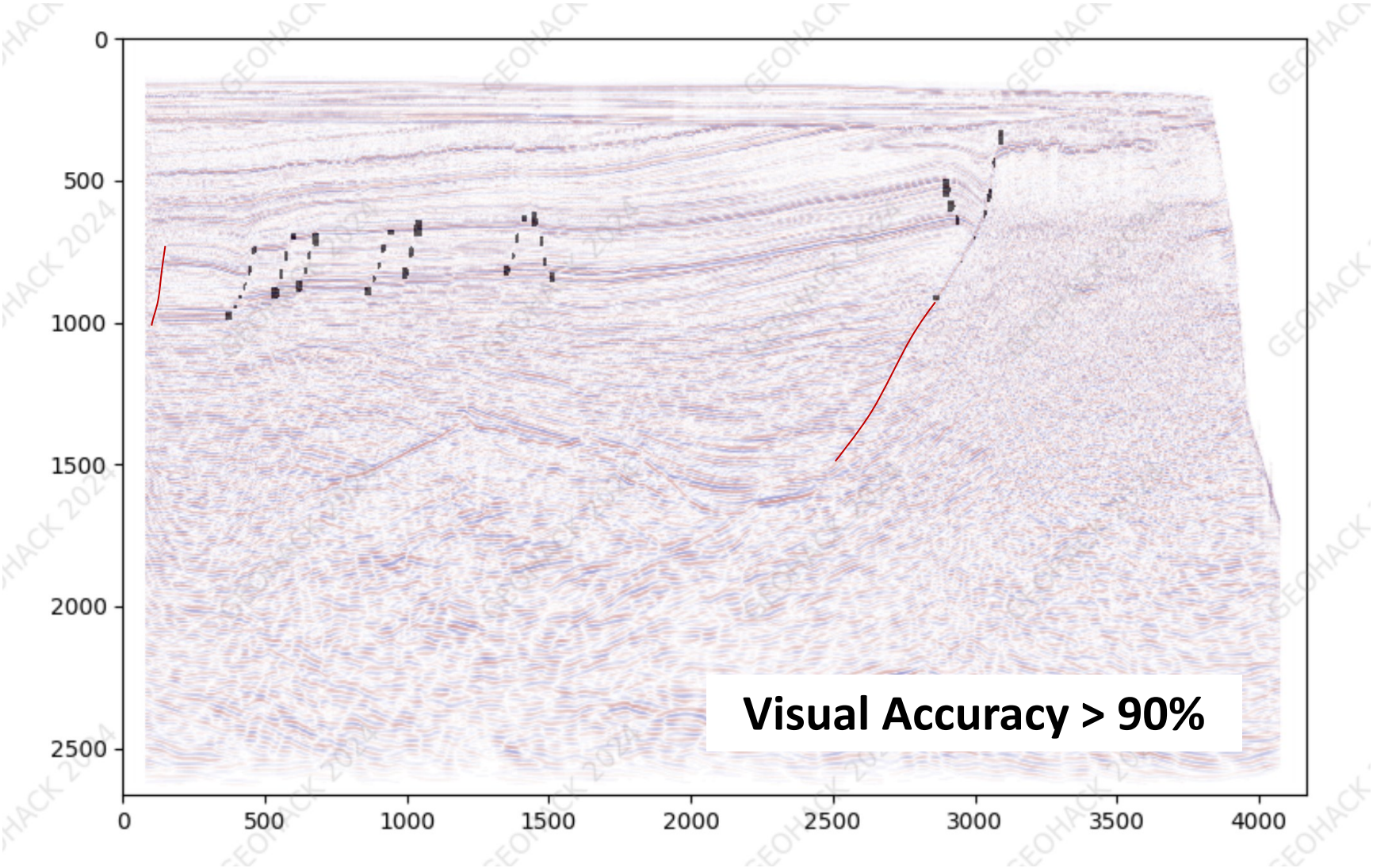
Mean – IOU or Visual Check



If we are not sure about the ground truth, how do we validate against it?



Visualization of results on holdout data



OUR SOLUTION

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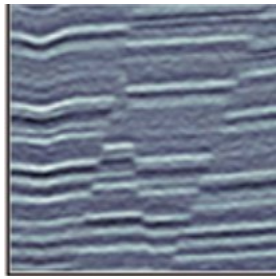
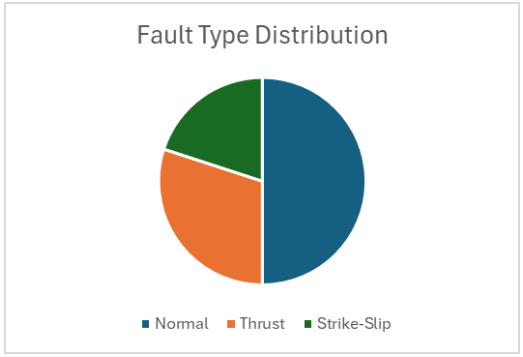
Future Improvements



- ✓ Train base model on synthetic seismic-fault data and fine tune on real data



- ✓ Classify faults and connect to large language model for quick insights on structural setting

Thank you!