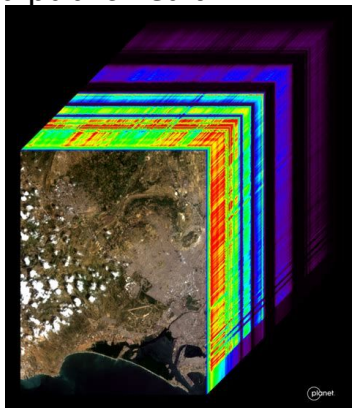


Motivation + Objectives

- Harmful Algal Blooms (HABs) threaten marine ecosystems and public health.



[3]

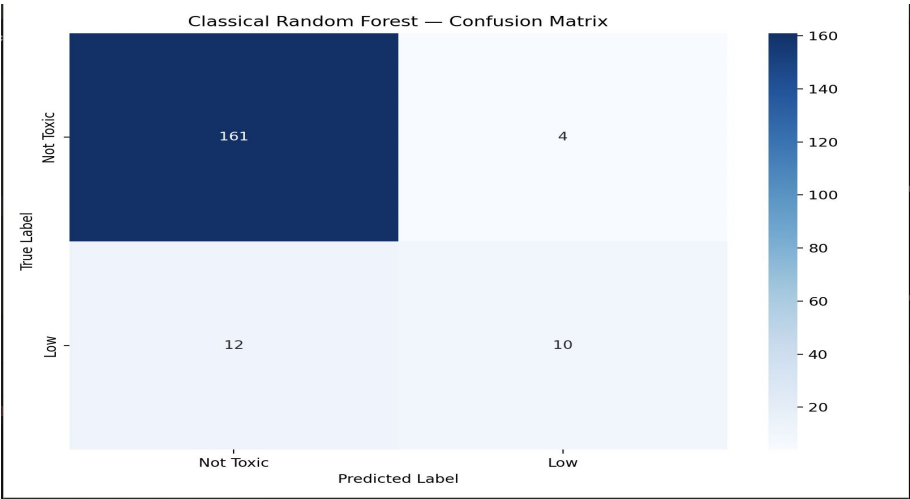
- Goal: Build a hybrid machine learning pipeline to detect HAB presence and exact toxicity levels from satellite imagery.

- The Scope: Train and validate using hyperspectral coastal data across North America.

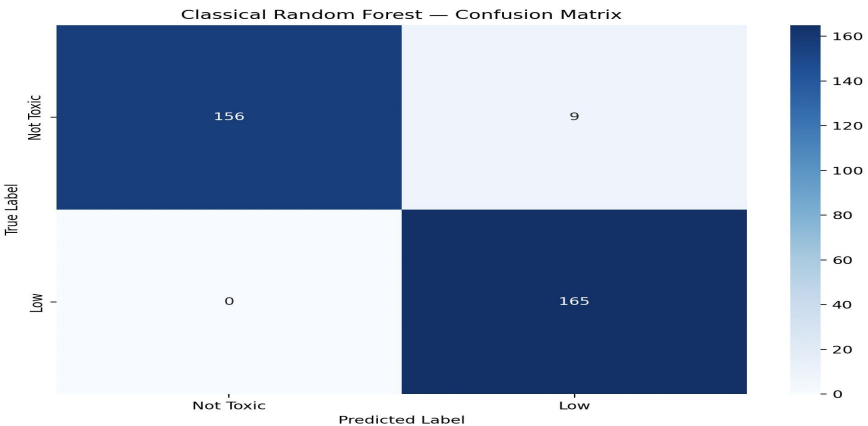
REU Site sponsored by NSF
 Award 2349567



Current Results

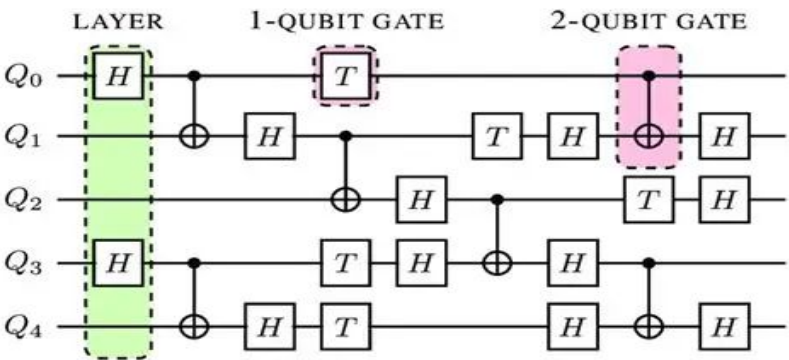


After SMOTE



Next Steps

- Scale from pixel-level processing to full image processing.
- Circuit Design: Implement a 5-qubit Quantum Neural Network (QNN) using PennyLane and Amazon Braket.
- The Benchmark: Map the full 176-band into quantum states for out performance from classical 91.6%.



References

[1] Miller, L., Uehara, G., and Spanias, A., "Image Fusion and Quantum Machine Learning for Remote Sensing Applications," IEEE, 2024.

[2] S. Vittal, D. Ramirez, G. Uehara, G. De Luca, and A. Spanias, "Quantum Generative Neural Networks for Imaging Applications," IEEE, 2024.

[3] Planet Labs PBC. (2024, September 24). First light images from Tanager-1 hyperspectral satellite. Planet Pulse. <https://www.planet.com/pulse/first-light-images-from-tanager-1-hyperspectral-satellite/>