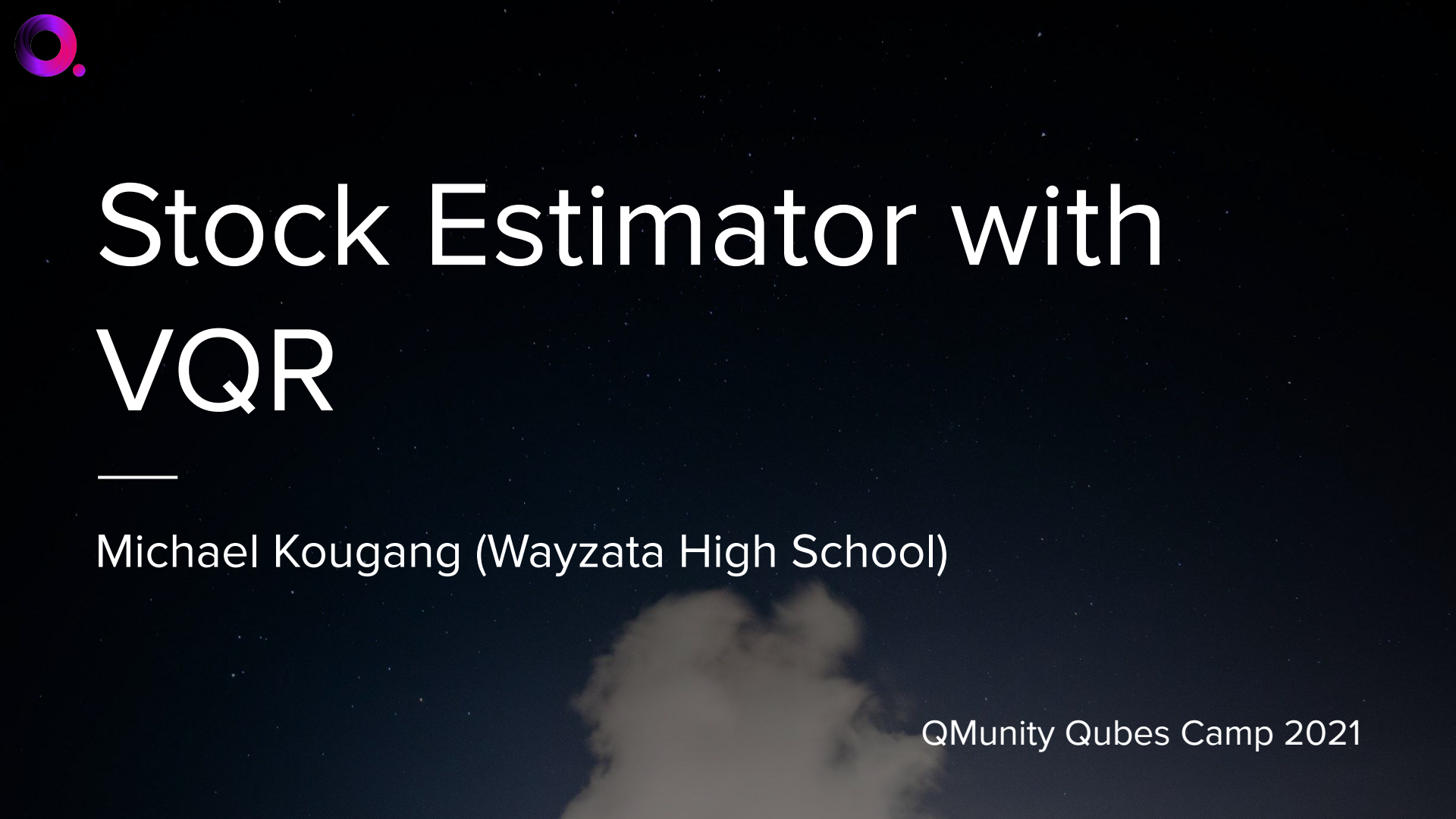


Stock Estimator with VQR

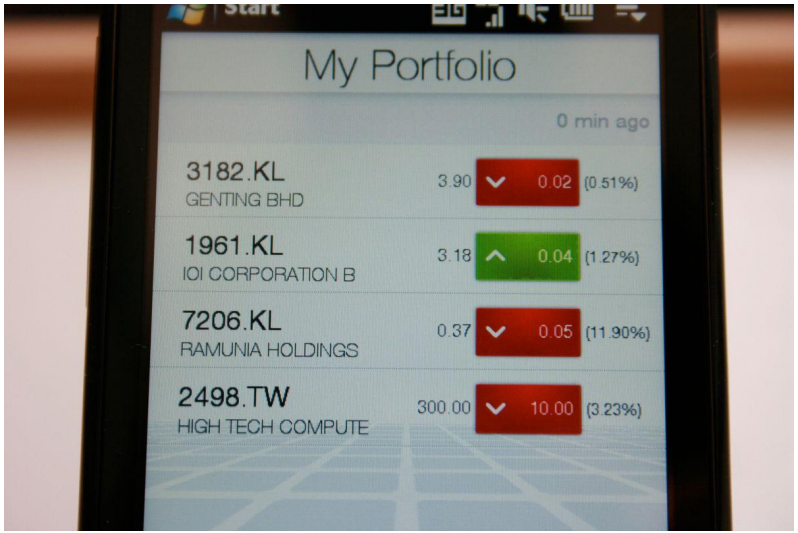
Michael Kougang (Wayzata High School)

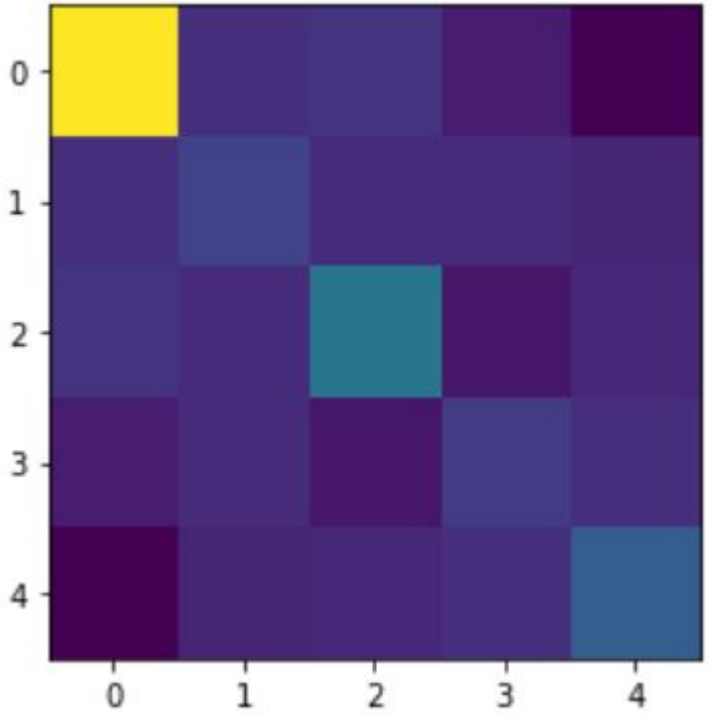
QMunity Qubes Camp 2021

Project Description

- Portfolio Optimization
- Quantum Approximate Optimization Algorithm
- Stock Analysis & Estimator
- Variational Quantum Regression

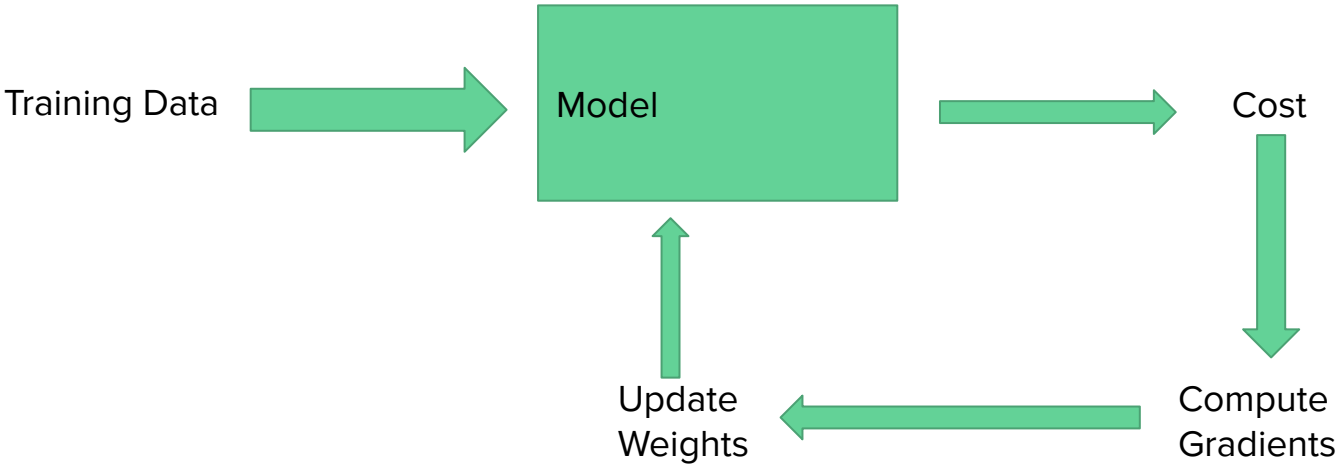
Portfolio Optimization





The process

Quantum Classifier



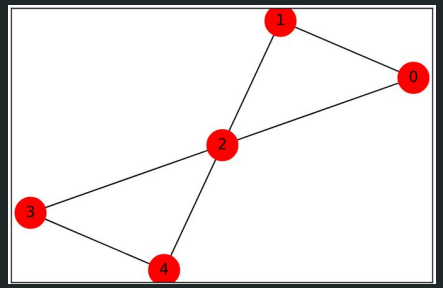
Variational Circuit (Ansatz)

Steps

- Data Encoding & Feature Mapping
- Apply the model / Variational Circuit
- Extract Labels
- Optimize and update model parameters

Quantum Approximate Optimization Algorithm

QAOA is a variational quantum eigensolver that can use MaxCut to optimize weights.



Qiskit Portfolio Optimization Implementation with QAOA

Variational Quantum Regression

Just like in classical regression, the goal of VQR is to predict an output based on a set of inputs.

Qiskit Stock Estimator Implementation with VQR

Research

https://born-2learn.github.io/posts/2020/12/variational-quantum-classifier/

https://qiskit.org/documentation/machine-learning/tutorials/02_neural_network_classifier_and_regressor.html#Regression

https://www.youtube.com/watch?v=N8e5nAk6KBQ&list=PLmRxgFnCIhaMgvot-Xuym_hn69lmzIokg&index=18

https://www.youtube.com/watch?v=AOKM9BkweVU

https://qiskit.org/documentation/finance/tutorials/01_portfolio_optimization.html

https://learn.qiskit.org/course/ch-applications/solving-combinatorial-optimization-problems-using-qaoa

https://medium.com/qiskit/building-a-quantum-variational-classifier-using-real-world-data-809c59eb17c2

https://qiskit.org/events/summer-school/

https://arxiv.org/abs/1411.4028

https://arxiv.org/abs/1304.3061

https://www.kaggle.com/camnugent/sandp500

Team contributions

Show major contributions of each team member

How did you all contribute to the project?

- Michael: researched quantum algorithms, coded Jupyter notebook, etc; (aka everything)

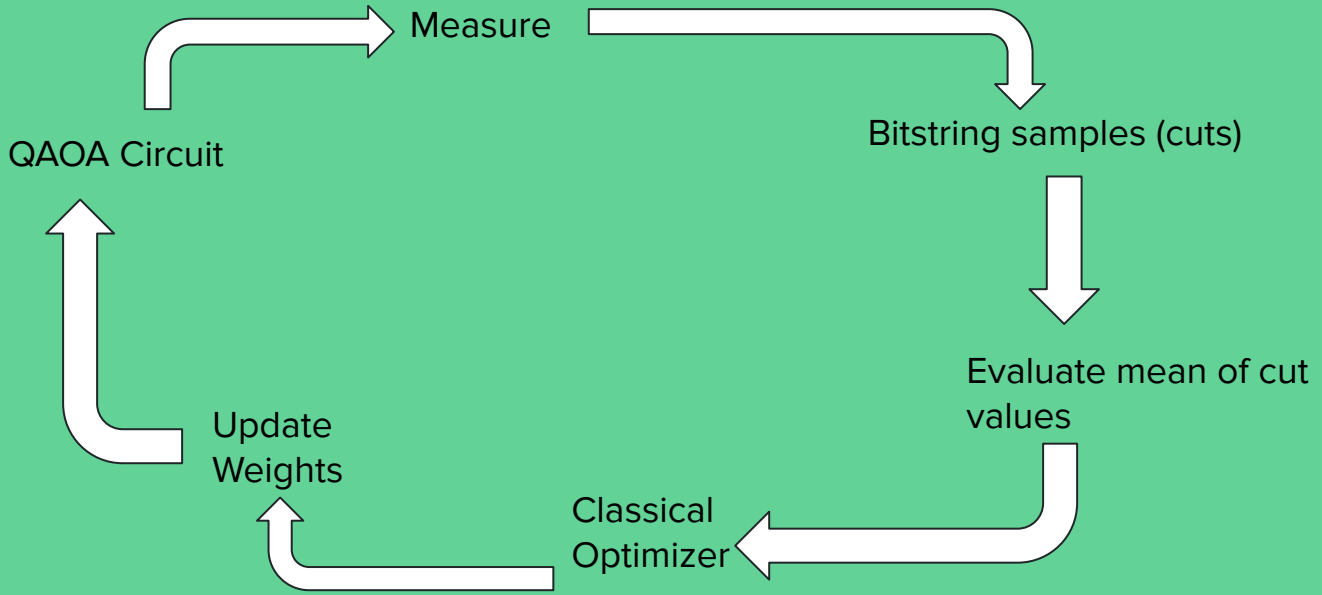
Aha!

Share some pictures

What did you want to highlight?

1. Really nice code?
2. Cool project results?
3. Impressive quantum circuit?

QAOA Overview

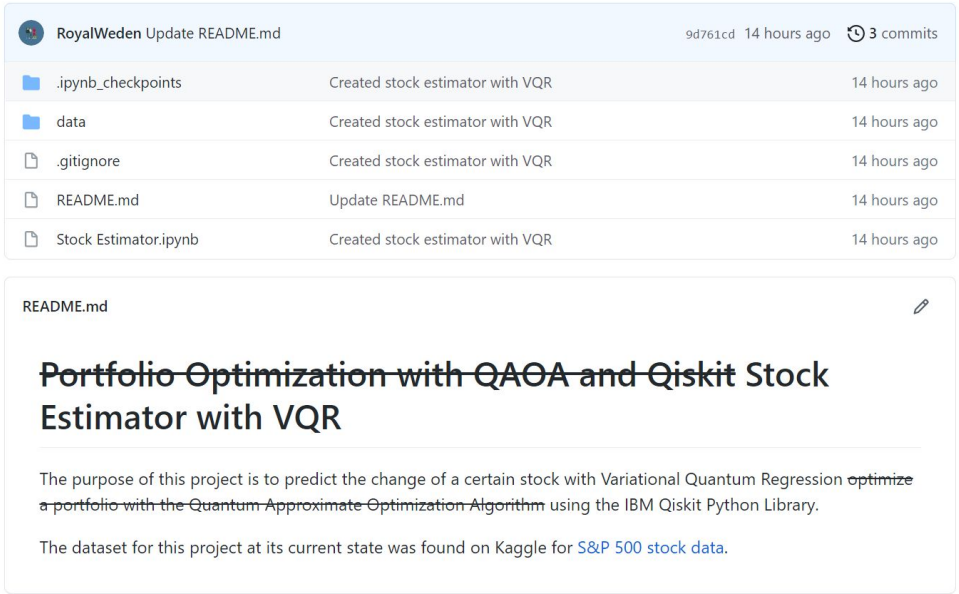


Conclusion

Variational Quantum Circuits have a lot of use for classification and regression. While we don’t have complete certainty that algorithms like QAOA will provide benefit from Quantum Computing, most signs show that this will be the case.

What will you do next?

- Gain a greater background in QML
- Create an easy-to-use web application for people to optimize their portfolios using QAOA or another VQC algorithm.
- Quantum Machine Learning Applications
- Other Finance Applications



RoyalWeden Update README.md — 9d761cd — 14 hours ago — 3 commits

.ipynb_checkpoints	Created stock estimator with VQR	14 hours ago
data	Created stock estimator with VQR	14 hours ago
.gitignore	Created stock estimator with VQR	14 hours ago
README.md	Update README.md	14 hours ago
Stock Estimator.ipynb	Created stock estimator with VQR	14 hours ago

README.md

~~Portfolio Optimization with QAOA and Qiskit~~ Stock Estimator with VQR

The purpose of this project is to predict the change of a certain stock with Variational Quantum Regression ~~optimize a portfolio with the Quantum Approximate Optimization Algorithm~~ using the IBM Qiskit Python Library.

The dataset for this project at its current state was found on Kaggle for S&P 500 stock data.

No description, website, or topics provided.

Readme

Releases

No releases published
Create a new release

Packages

No packages published
Publish your first package

Languages

Jupyter Notebook 100.0%

https://github.com/RoyalWeden/qubes-project

Thank You!

Mentors and Instructors

Special Thanks to
Syed