



Stock Estimator with VQR

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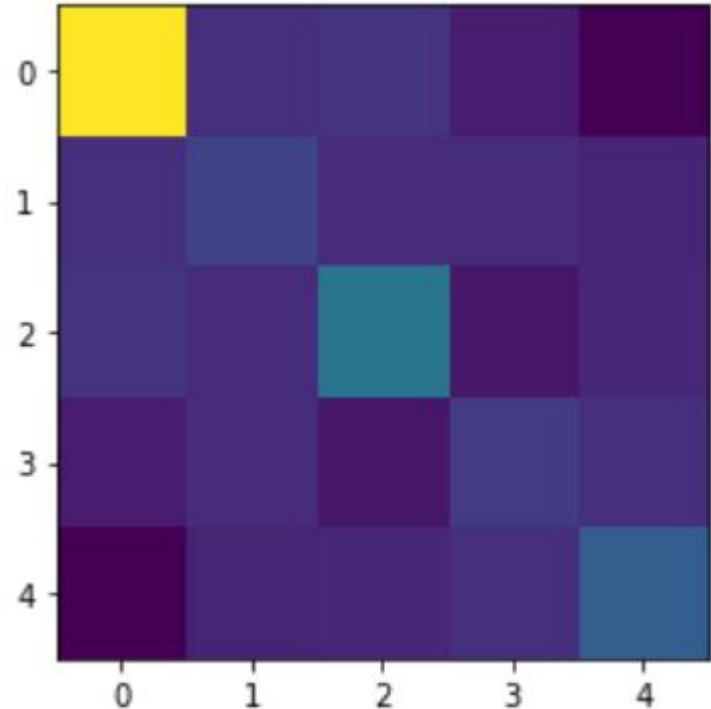
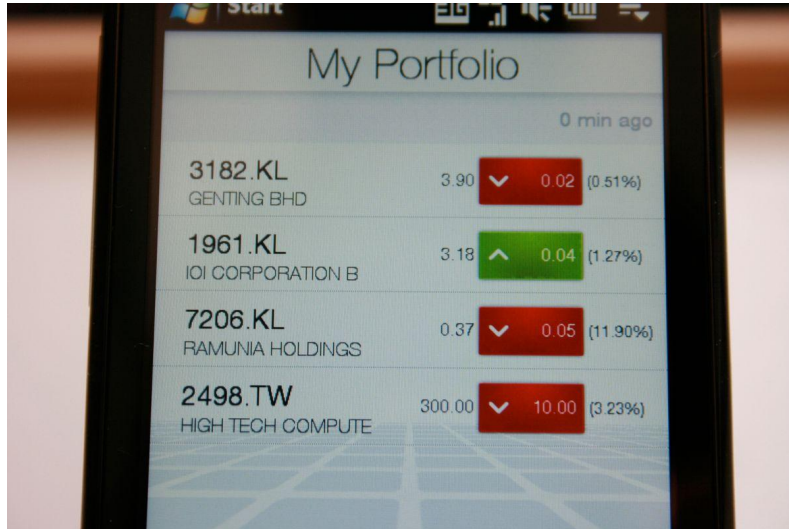
QMunity Qubes Camp 2021



Project Description

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

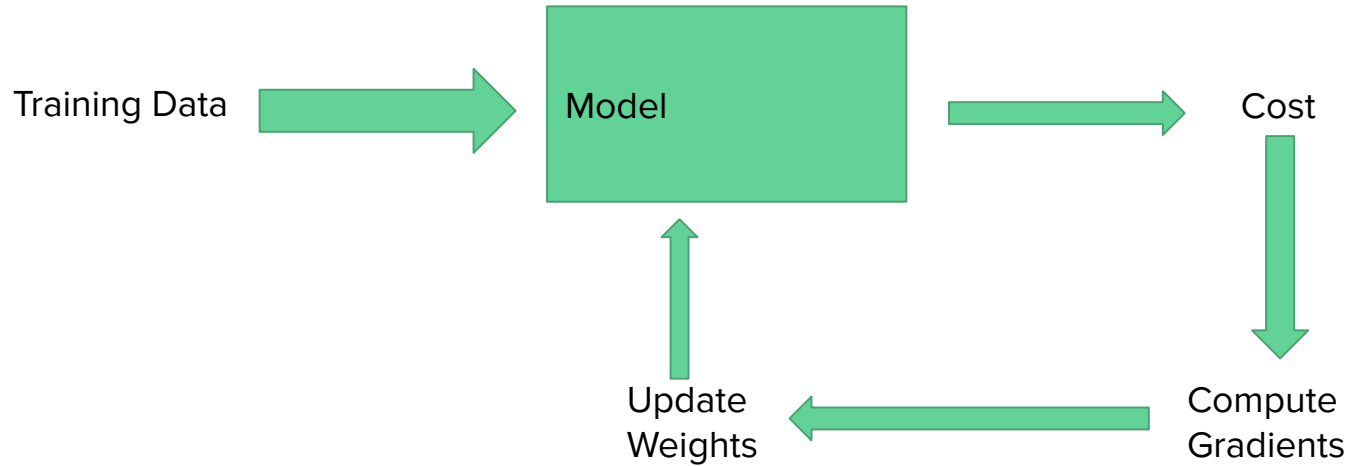
Portfolio Optimization



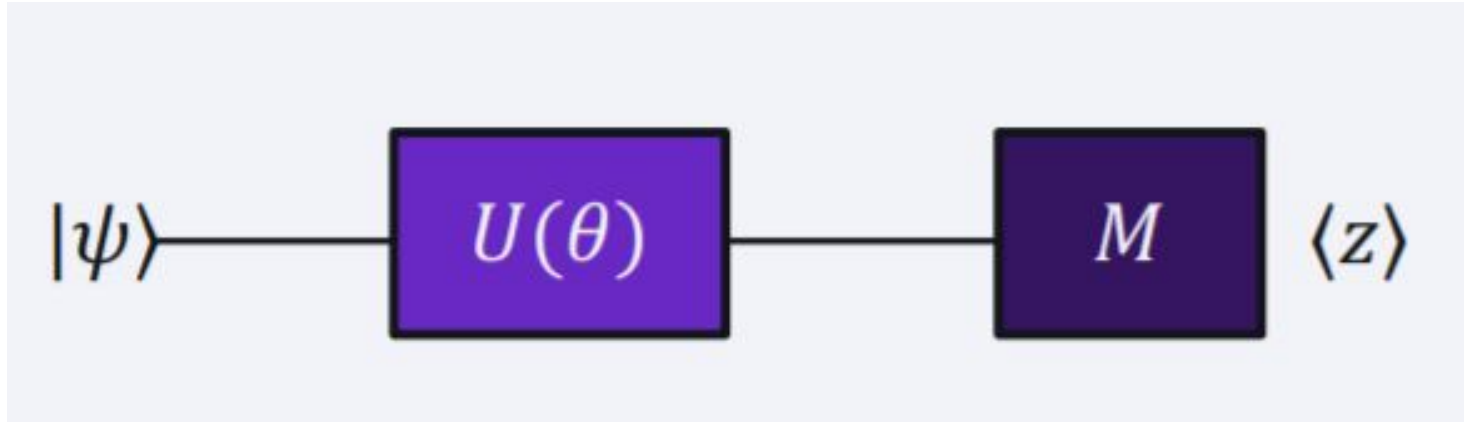


The process

Quantum Classifier



Variational Circuit (Ansatz)



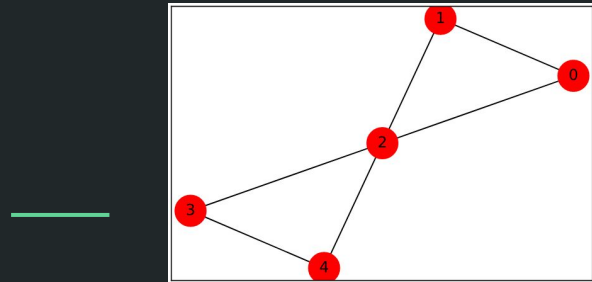
Steps

- 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=PLmRxgFnClhaMgvot-Xuym_hn69lmzlokg&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

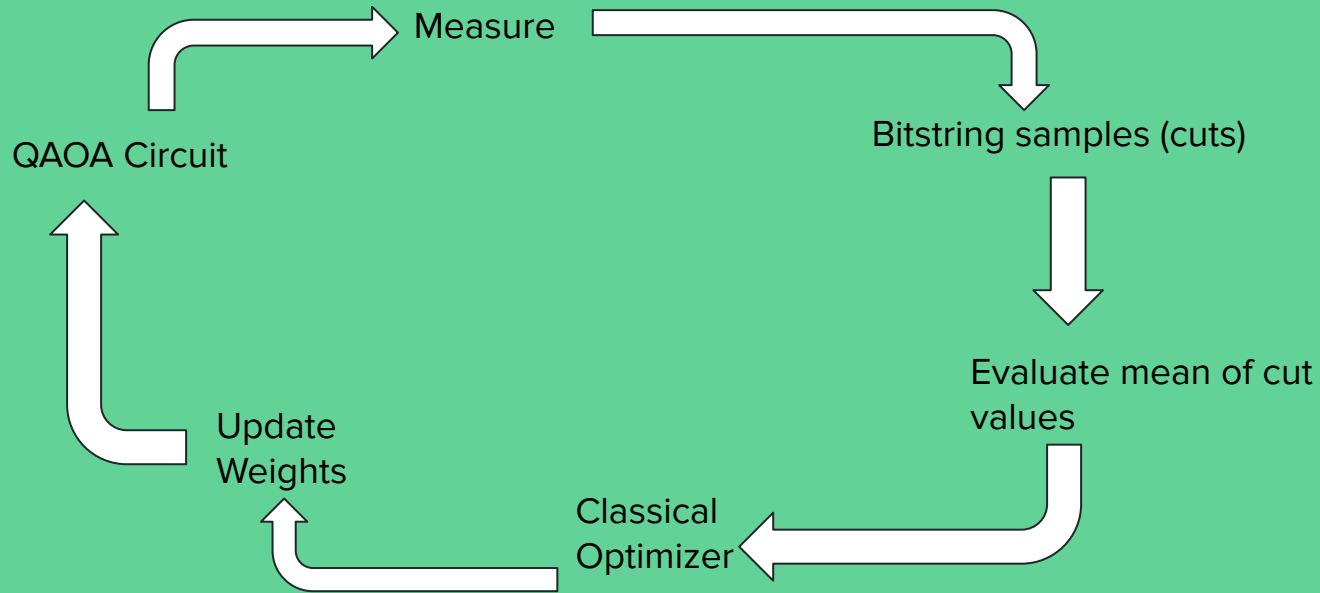
What did you want to highlight?

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.md9d761cd 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/qml-portfolio-optimization>

Thank You!

Mentors and Instructors

Special Thanks to
Syed