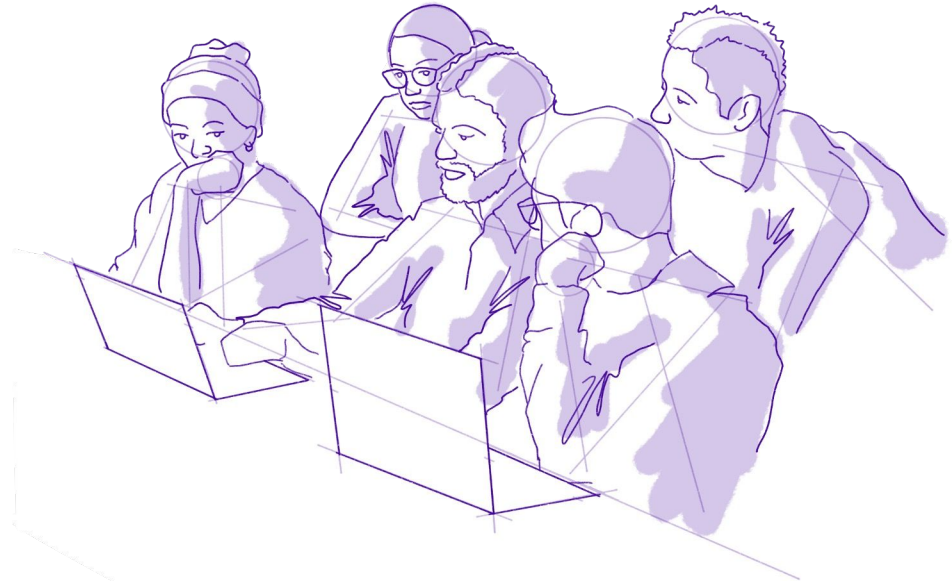# Qiskit Advocate Mentorship Program (QAMP) Fall '22

Qiskit

Functional magnetic resonance imaging (fMRI) Analysis

Mentor: Robert Loredo

IBM Quantum Ambassador worldwide lead,
Qiskit Advocate, IBM Master Inventor

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Jody Burks

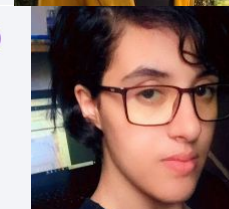North America

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Project
Statement

What is
FMRI?

Deliverable
objectives

Project
Updates

A G E N D A

Functional magnetic resonance imaging (fMRI)

Functional magnetic resonance imaging (fMRI) and magnetic resonance imaging (MRI) are techniques that allow soft tissue and blood to be represented as images.

The goal for the project:
1- Represent the fMRI information
2- Determine innovative ways to analyze the information from an open-source data repository of controlled centers.

Project Deliverables

A working circuit of the project running on both a simulator and physical quantum device

A presentation describing the work done and outcomes

A draft for Qiskit tutorial/textbook/ publish a reseach paper

What is FMRI?

The benefit of having this Functional MRIs in addition to structure MRIs is that we are not only looking at the brain's structure, but we are also looking more in-depth at the function of the brain.

So, we know in addition to the type of damage the patient has, what function is danged? Then we can tell how they are going to fix this function in the future with Quantum techniques

Our First step

The usage of QC Transfer learning scheme

Why QC Transfer learning?

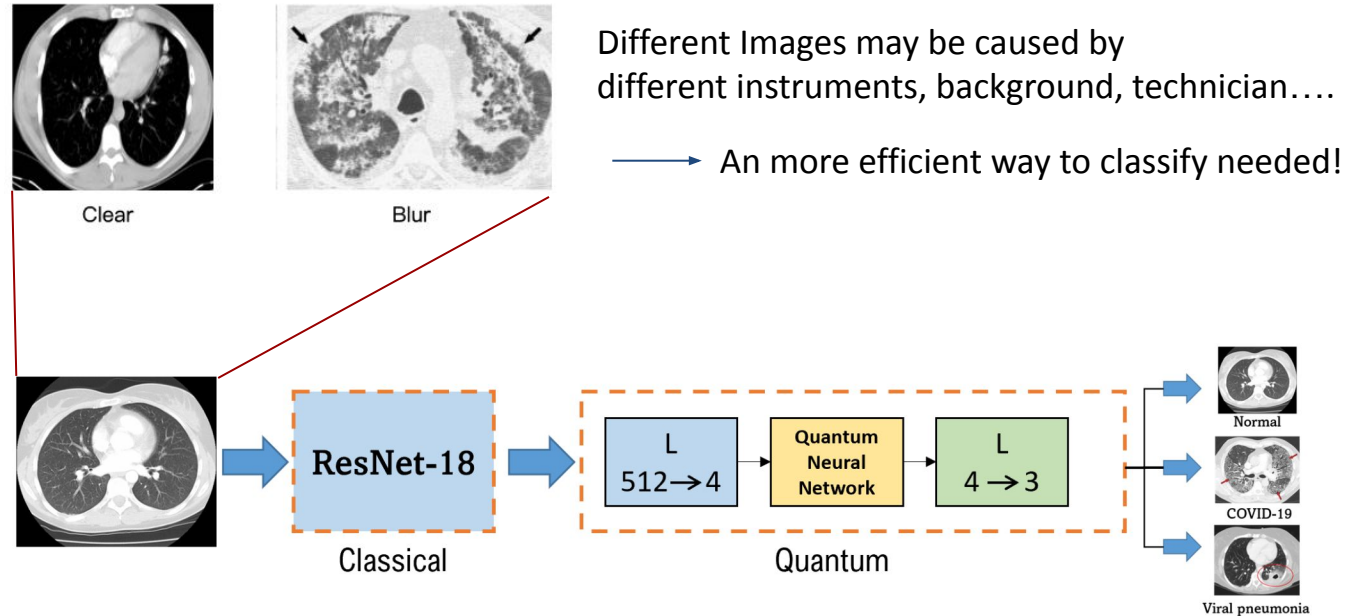1- Provides fast training progress

2- we can use small training datasets to achieve incredible results
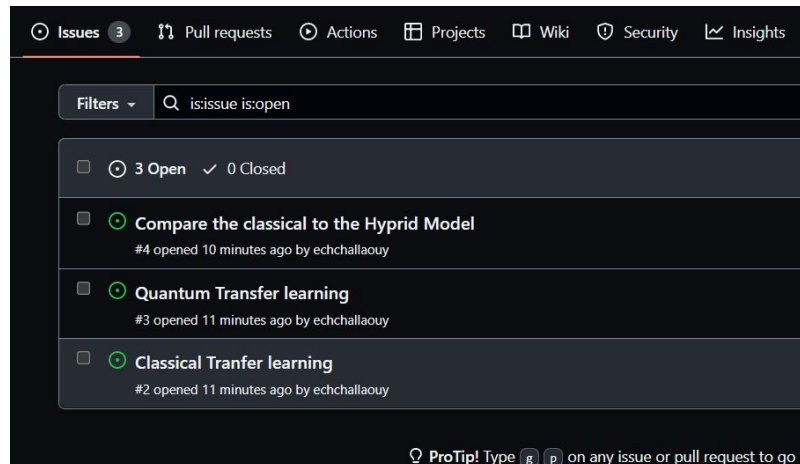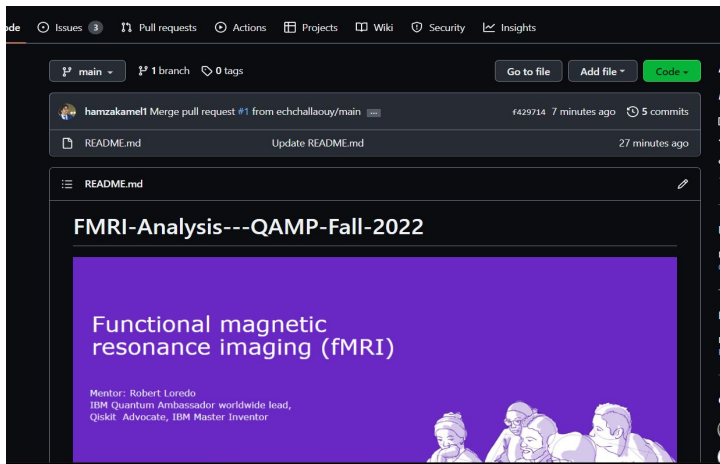
the transfer learning method:

Network A	Network B	Transfer learning scheme
Classical	Classical	CC - Standard classical method. See e.g., Ref. [2].
Classical	Quantum	CQ - **Hybrid model presented in this tutorial.**
Quantum	Classical	QC - Model studied in Ref. [1].
Quantum	Quantum	QQ - Model studied in Ref. [1].

A graphical representation of the full data processing pipeline is given in the figure below:
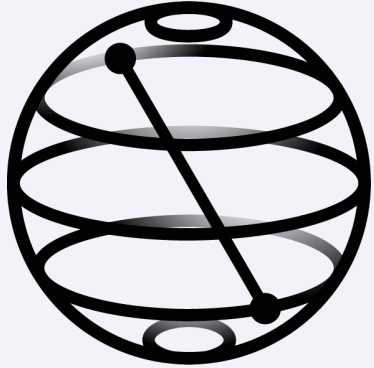

Different Images may be caused by different instruments, background, technician….

An more efficient way to classify needed!

Github repo to manage our progress

Qiskit

GitHub repository:
https://github.com/jvscursulim/qamp_fall22_project

GitHub repository:
https://github.com/hamzakamel1/FMRI-Analysis---QAMP-Fall-2022

Thank you!