

Quantum Image Pre-Processing of MRIs for Brain Tumor Classification



2025 Quantum Machine Learning REU Program

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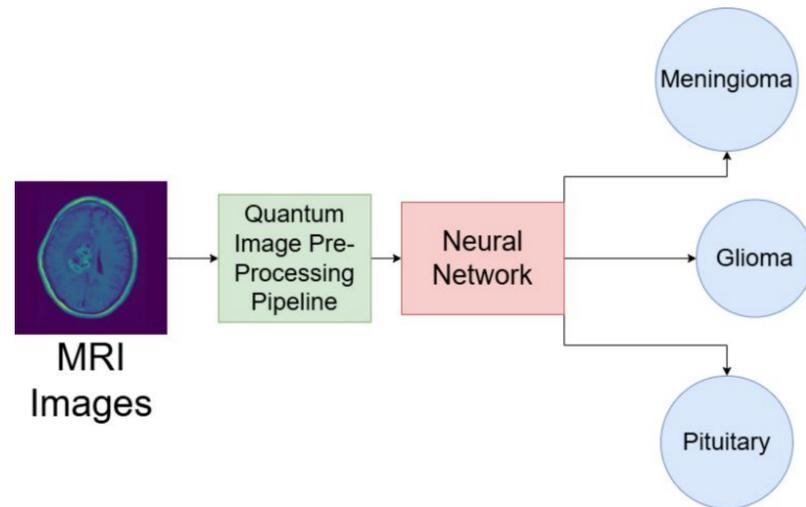
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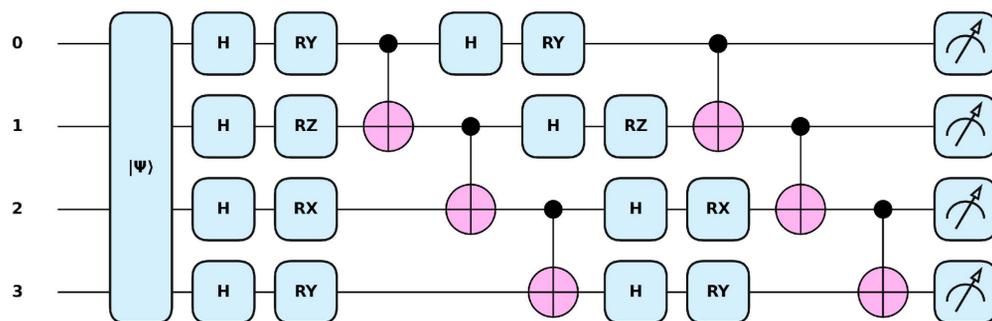


Research Goals

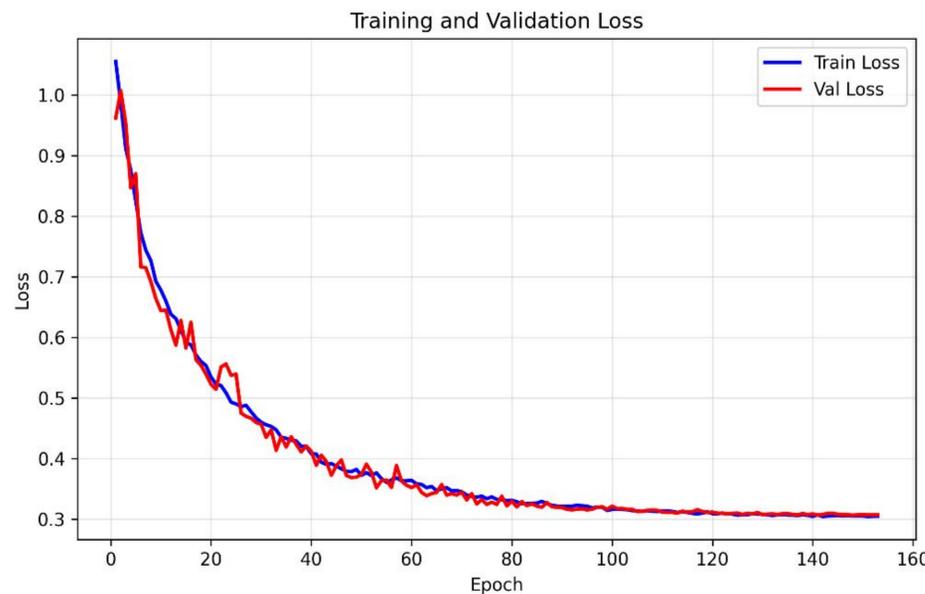
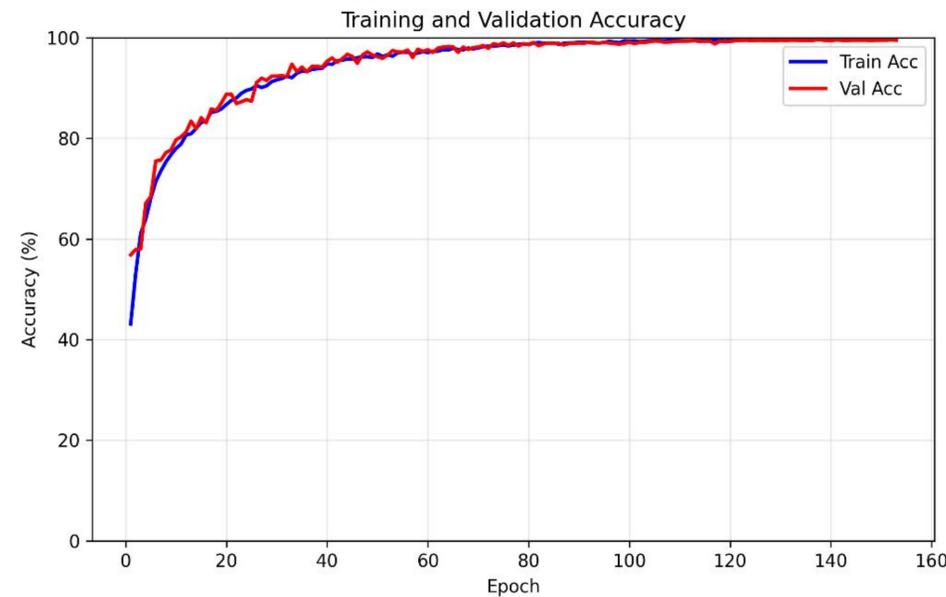
- Classification of three classes of brain tumors using MRI Images.
- Improve efficiency of Computer-Aided Diagnosis.
- Use quantum pre-processing to enhance complex features early in training.
- Prune a model to reduce parameter count.



4-Qubit Quantum Circuit for Brain Tumor Image Processing

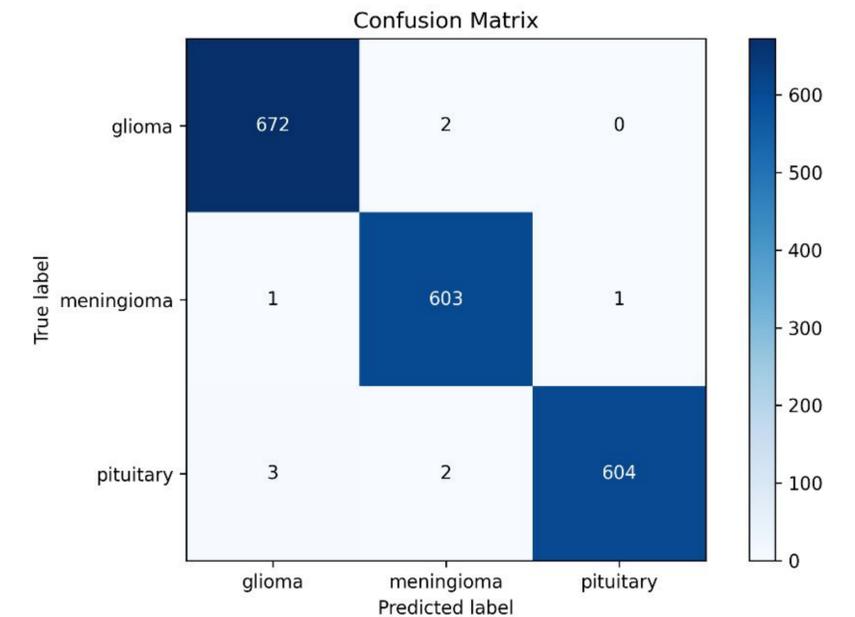


Preliminary Results



Conclusion

- Results of training on fusion.
- **99.58%** accuracy with **~1.6M** parameters.
- Images combined from three popular brain tumor datasets



Next Steps

- Conduct comparison studies between fusion, classical, and quantum pre-processing methods.
- Comparative analysis across datasets and models.
- Quantum noise simulations.
- Implement pruning to further reduce parameter count.

