Problem Statement Title: Diabetic Retinotherapy using Quantum Computing

Team Name: 686250-UN50G45I

Team members details

Team Name	686250-UN50G45I		
Institute Name/Names	KL Deemed to be University, Guntur, Andhra Pradesh		
Team Members >	**1 (Leader)**	**2**	**3**
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Batch	Y20		

Deliverables/Expectations for Level 2 (Idea + Code Submission)

Using Quantum Cloud:

We have performed certain tasks more efficiently than classical computers, making them for enhancing machine learning processes.

1. **100% Accuracy:**
   This means that the model correctly classifies all instances, indicating that there are no false positives or false negatives in its predictions.
2. **100% Precision**:
   Precision refers to the ratio of true positive predictions to the total positive predictions. In this case, it means that all the instances classified as positive are indeed positive, without any false positives.
3. **100% Recall**:
   Recall is the ratio of true positive predictions to the total actual positives. Achieving 100% recall means that the model identifies all positive cases without any false negatives.
4. **100% F1-Score**:
   The F1-score is the harmonic mean of precision and recall. It provides a balance between precision and recall. Achieving 100% F1-score indicates an excellent balance between accurate positive predictions and comprehensive coverage of positive cases.

Use-cases

- **Quantum Neural Networks for Image Classification(P0):**

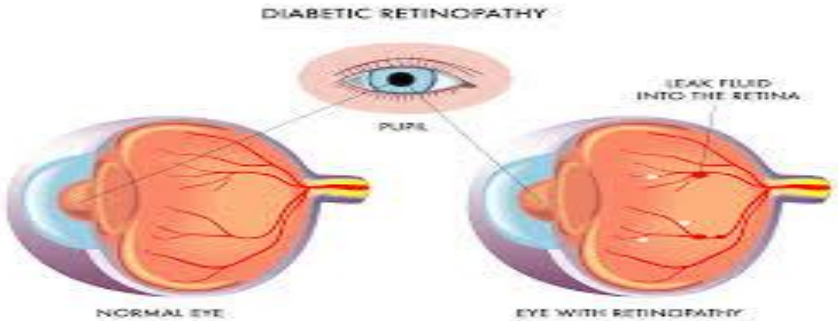
Traditional image classification methods may struggle with complex image patterns. Quantum neural networks offer a potential solution

- **Quantum Cloud-Based Collaboration for Dataset Analysis(p1):**

The cloud platform to collectively analyze retinal image datasets for diabetic retinopathy research

- **Quantum-Assisted Image Feature Extraction(P2):**

This image analysis techniques used to extract subtle features from retinal images that indicate early signs of diabetic retinopathy.



Solution statement/ Proposed approach

Quantum Neural Networks for Image Classification

1. Sub-Problem: Existing image classification methods may struggle to accurately classify retinal images based on disease

Solution: These are specialized type of neural network that leverages quantum properties to enhance the processing of complex data, such as images.

2. **Quantum Cloud-Based Collaboration for Dataset Analysis**

Sub-Problem: Analysing large-scale retinal image datasets requires significant computational resources and collaborative efforts

Solution: Quantum cloud platforms provide researchers with access to quantum processors and computational resources through remote cloud interfaces.

3. **Quantum-Assisted Image Feature Extraction**

Sub-Problem: Traditional image analysis techniques struggle to extract subtle features from retinal images that indicate diabetic retinopathy progression

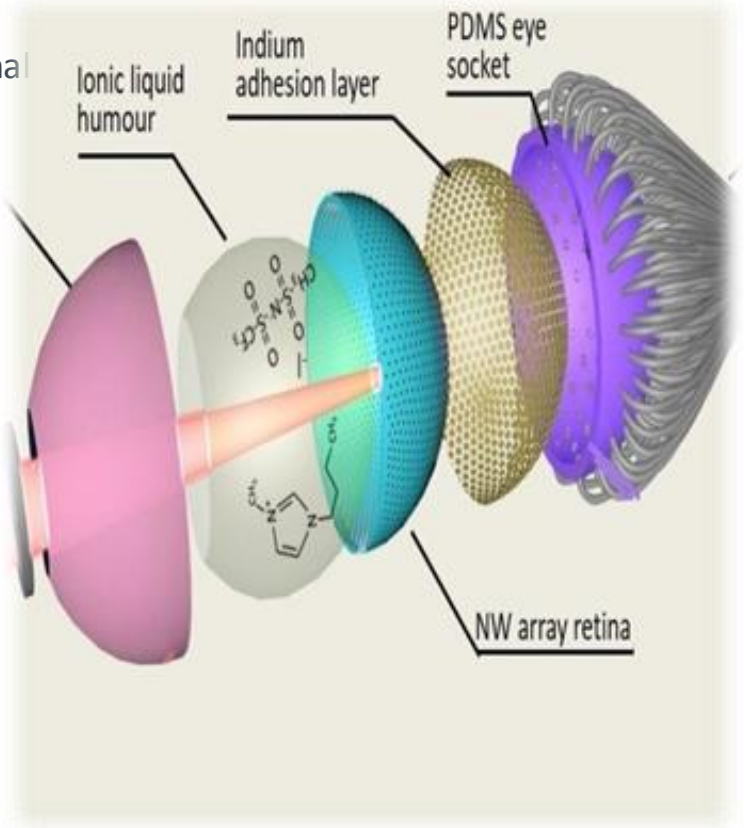
Solution: Convert pixel values of retinal images into quantum states using techniques like quantum amplitude encoding.

Limitations

High Prevalence
Limited Access to Healthcare
Variability in Disease Progression
Asymptomatic Early Stages
Patient Compliance
Late Detection
Patient Education and Empowerment
Complex Disease Progression
Impact on Quality of Life

Future Scope

- ✓ **Telemedicine and Remote Monitoring** : They enable remote retina
Screening and monitoring , allowing individuals with diabetes
- ✓ **Nanotechnology and Drug Delivery:**
lead to innovative drug delivery systems targeting the retina.
- ✓ **Neuroprotection Strategies:** retinal neurons and blood vessels could mitigate the progression of diabetic retinopathy and preserve visual function.
- ✓ **Virtual Reality and Simulation:** Virtual reality platforms can aid in educating healthcare professionals and students
- ✓ **Regenerative Medicine:** Ongoing research into regenerating retinal tissue through cell-based therapies or bioengineered
- ✓ **Integration with Diabetes Management:** Integrating retinopathy screening and management with broader diabetes care programs
- ✓ **Early Detection Algorithms:** Developing advanced algorithms that can identify subtle changes in retinal images



Finally Our complete project

https://github.com/klu2000031625/Diabetic-Retinopathy.git

Code Explanation Video Link:

https://drive.google.com/file/d/13Plwc3m1I9dIM5i_Wc3s7t7IKHObmP41/view?usp=sharing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Thank You