Tasks due by 26th October:

1. Review and read 10 recent papers on ocular / eye disease detection using classical and quantum approaches (since 2022 on google scholar) - 6 classical papers, 4 quantum papers
2. List at least 10 important limitations of the works/ future works suggested by the works
3. Find out the CNN and QNN models most commonly (at least five) used in the task of ocular disease detection from images using deep learning / computer vision. Report the best results from each paper
4. Set up experimental pipeline on kaggle/colab (Data Accessing and Preprocessing, Dataset Creation and Splitting, Data Loading and Augmentation, Sample Data Visualization, Data Distribution Visualization) - share the notebook link with me

Tasks due by 10th November:

1. Review and read 5 more papers
2. Build 3 most commonly used QNN models for classification based on the 15 papers you have read in Qiskit or in Pennylane
3. Report the model visualizations, and number of learnable parameters in the model
4. Use PCA as dimensionality reduction on your original dataset, and use angle encoding to encode the data in quantum models
5. Use the reduced dataset to perform classification (binary classification, disease present or not) using the QNN models. Report the results table: Models, Accuracy, Macro-F1, Precision, Recall and AUROC scores.
6. Build classical models with similar number of parameters as your quantum models (one similar classical model for each QNN model)
7. Use the original dataset (not reduced by PCA) to perform classification on the models. Report the results table: Models, Accuracy, Macro-F1, Precision, Recall and AUROC scores.

Tasks due by 24th November:

1. Review and read 5 more papers (focus on hybrid architectures in medical imaging)
2. Develop the hybrid classical-quantum architecture:
    - Implement classical CNN feature extractor
    - Design quantum circuit layer for enhanced representation, pass the extracted features through quantum layers
    - Create classical fully-connected classification layer
3. Perform comprehensive ablation studies:
    - Test different quantum circuit architectures
    - Evaluate impact of circuit depth
    - Analyze contribution of each component
4. Implement model interpretability analysis:
    - Generate feature importance maps
    - Create explainable visualizations using GradCAM / LIME
    - Analyze decision boundaries

5. Conduct error analysis:
   - Create confusion matrices
   - Identify common misclassification patterns
   - Document edge cases
6. Compare performance with:
   - Pure classical models
   - Pure quantum models
   - Previous hybrid results