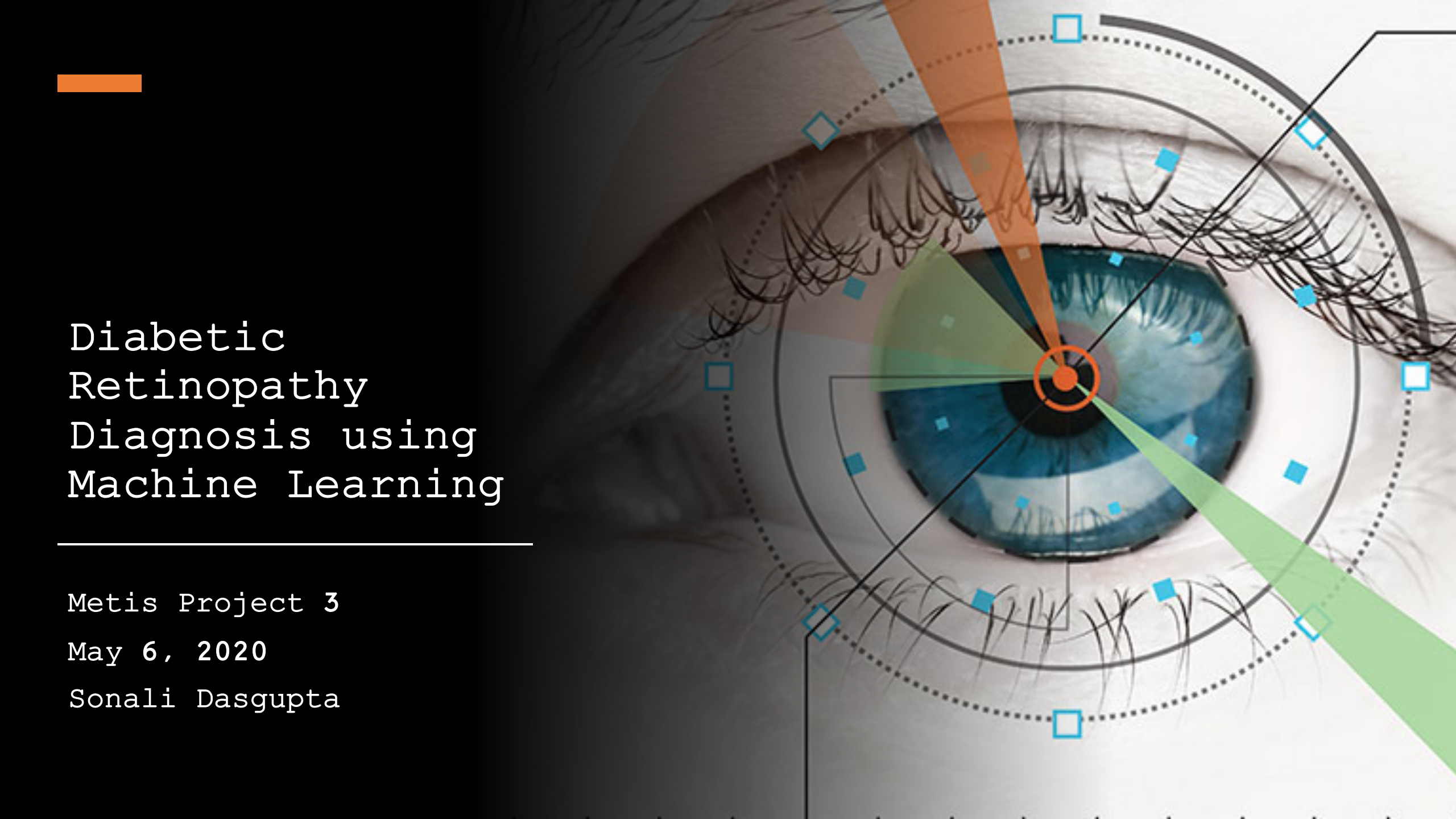
Diabetic Retinopathy Diagnosis using Machine Learning

Metis Project 3

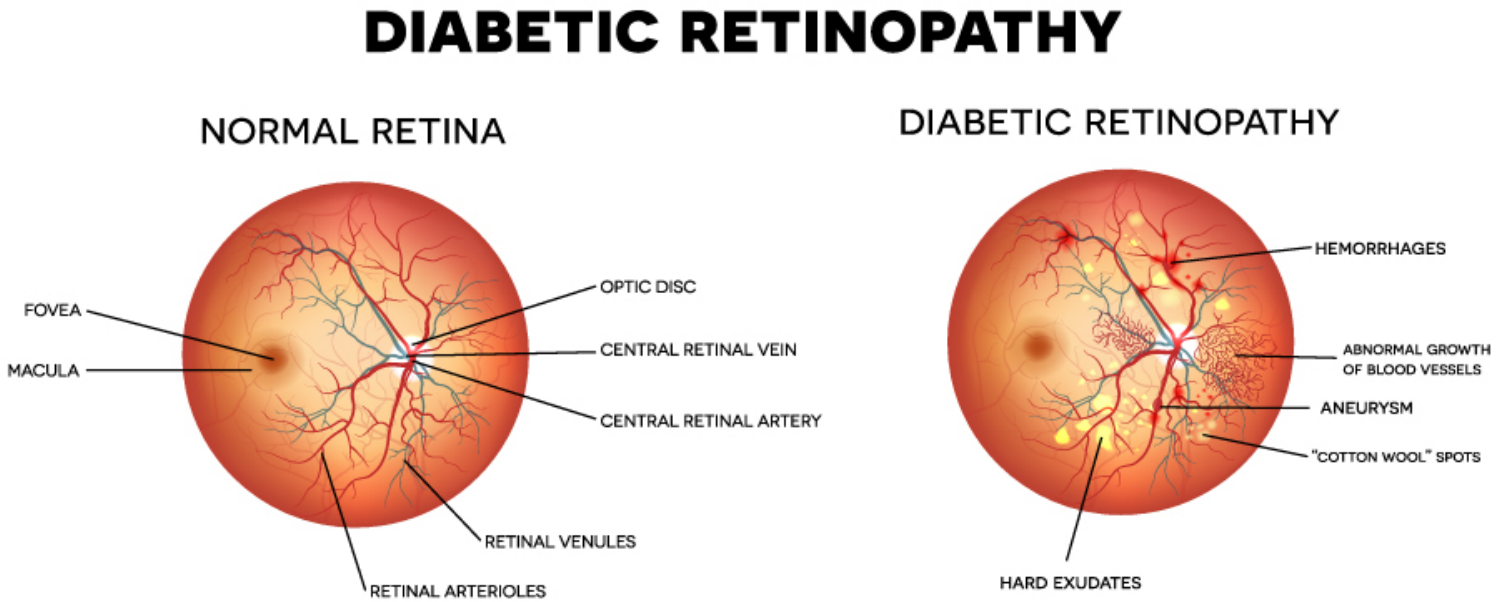
May 6, 2020

Sonali Dasgupta

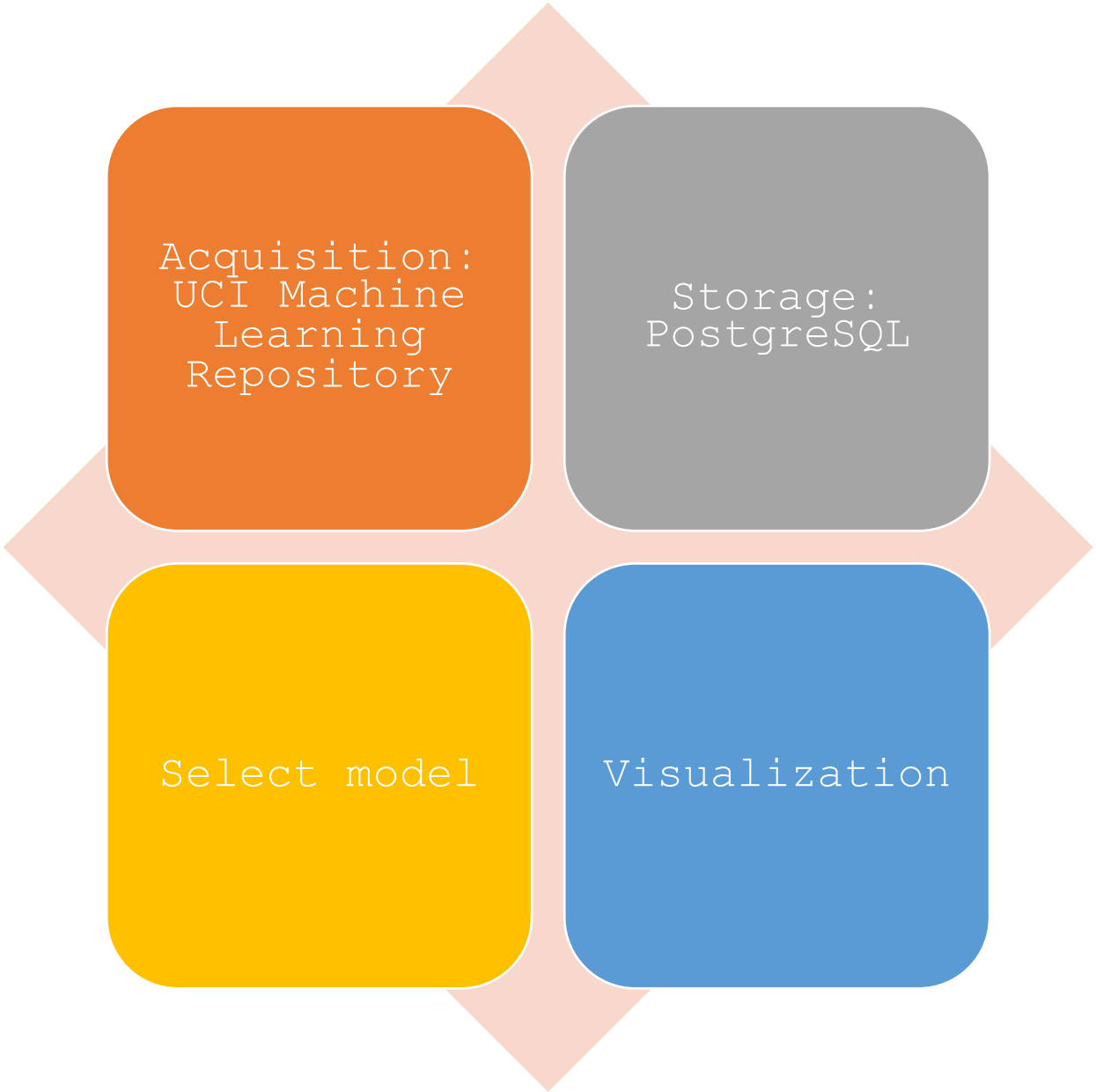


Prevalence and Diagnosis

- Around 100 million people have diabetic retinopathy
- Dynamic disease
- Human error in diagnostic capabilities
- Target audience: physicians and optometrists/ ophthalmologists



Data Source and Process

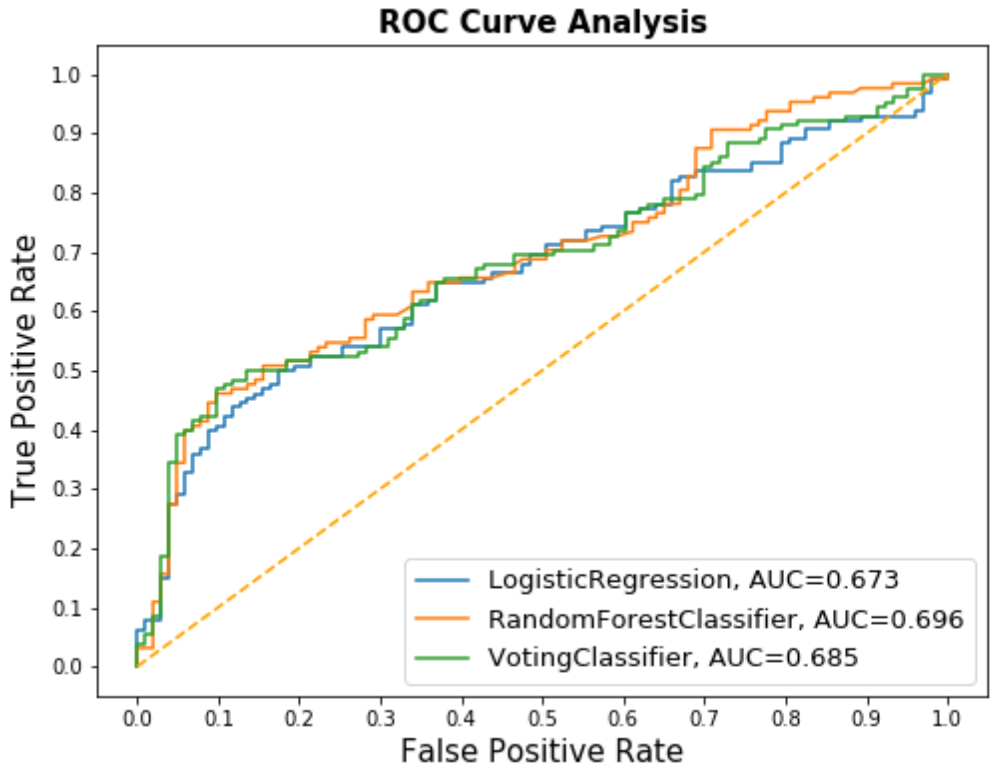


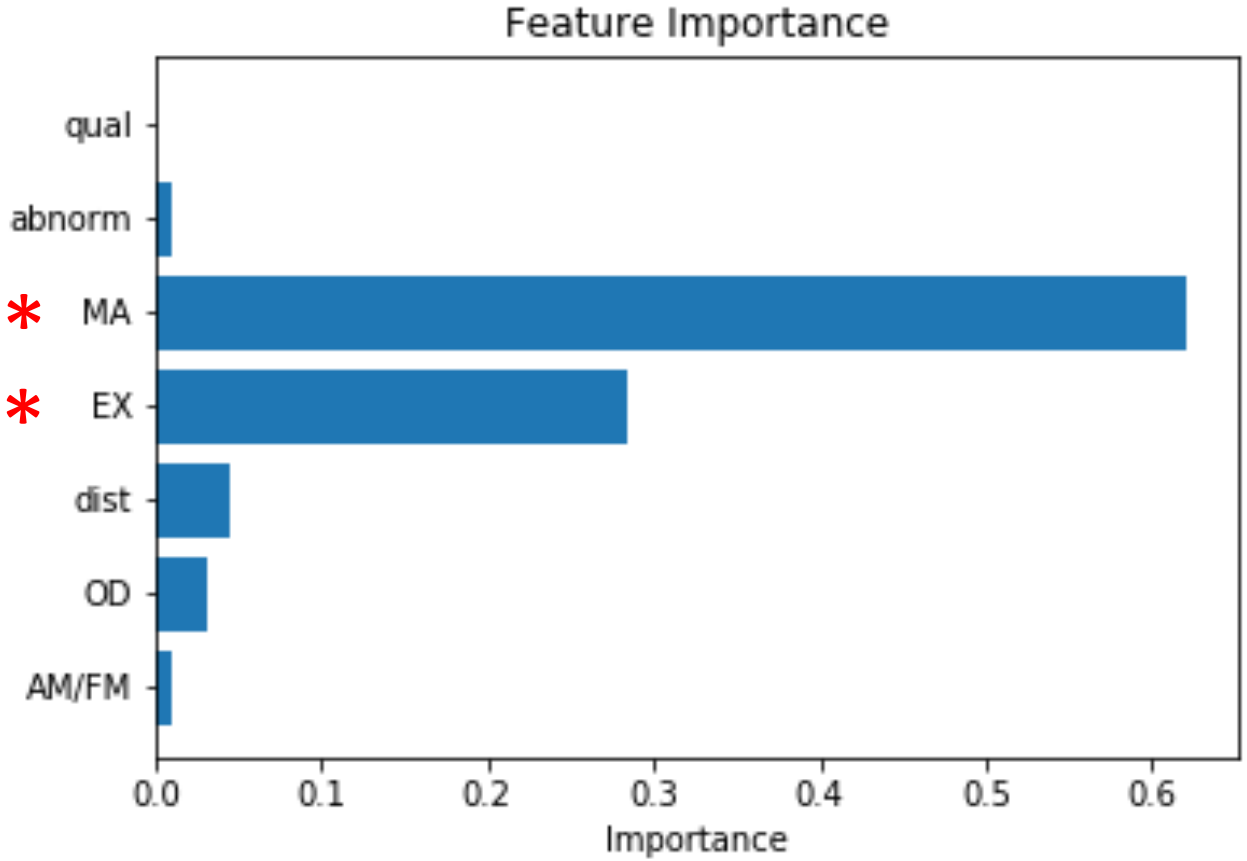
Features Considered

- Assessment quality (qual)
- Retinal abnormality (abnorm)
- Microaneurysms (MA)
- Exudates (EX)
- Distance from macula to optic disc (dist)
- Diameter of optic disc (OD)
- AM/FM classification of image (AM/FM)
- Class

Model Selection

Model	ROC-AUC score
Logistic Regression	0.673
Random Forest	0.696
Ensemble	0.685





Results

This model predicts whether a patient has diabetic retinopathy or not with **63% accuracy**

F1.5 score: **0.570**

- Microaneurysms and exudate presence in the retina are important predictors of diabetic retinopathy

Future Work

Image analysis and expanding to other datasets if available

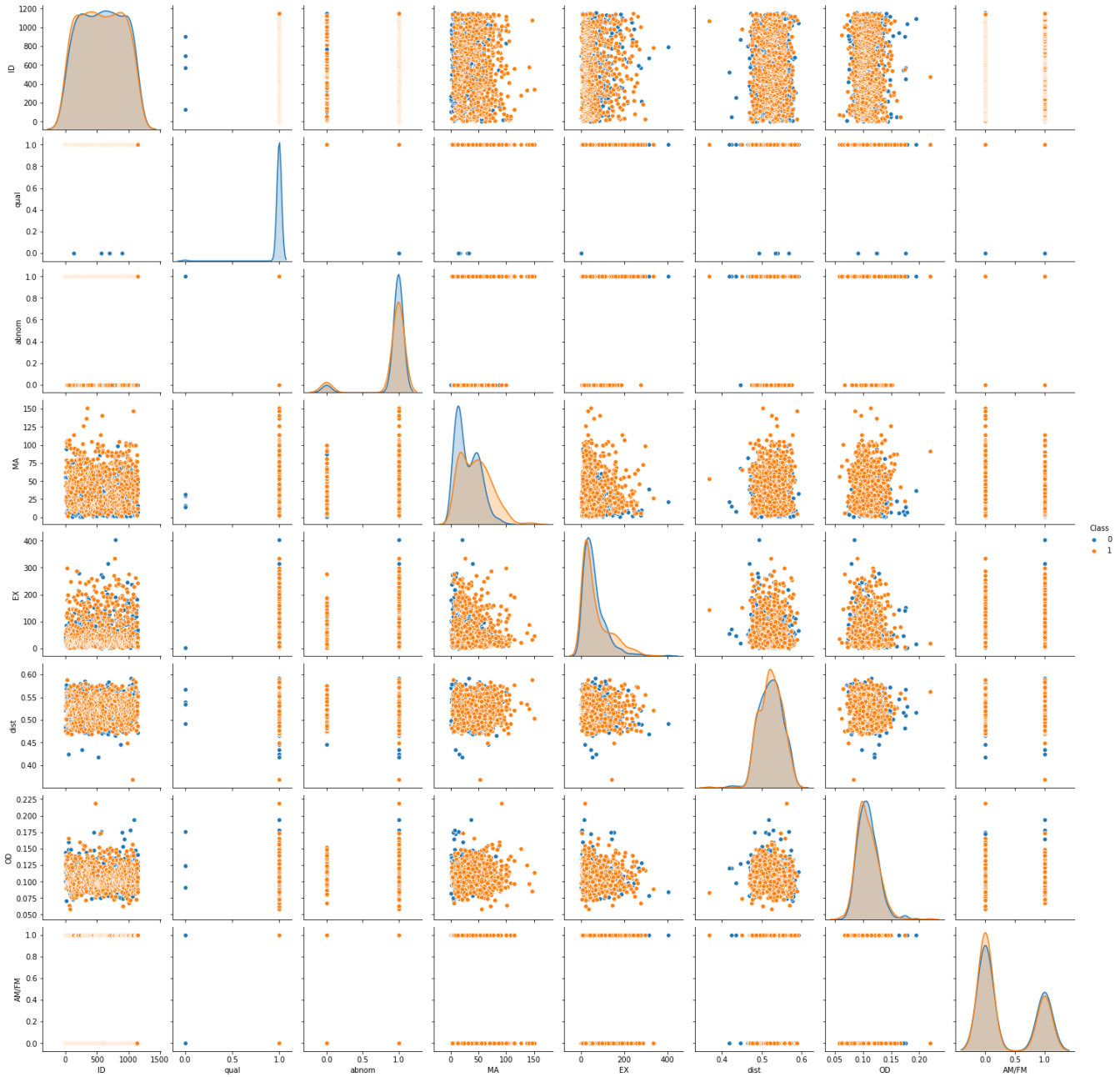
Additional datasets with other patient measurements

Sources

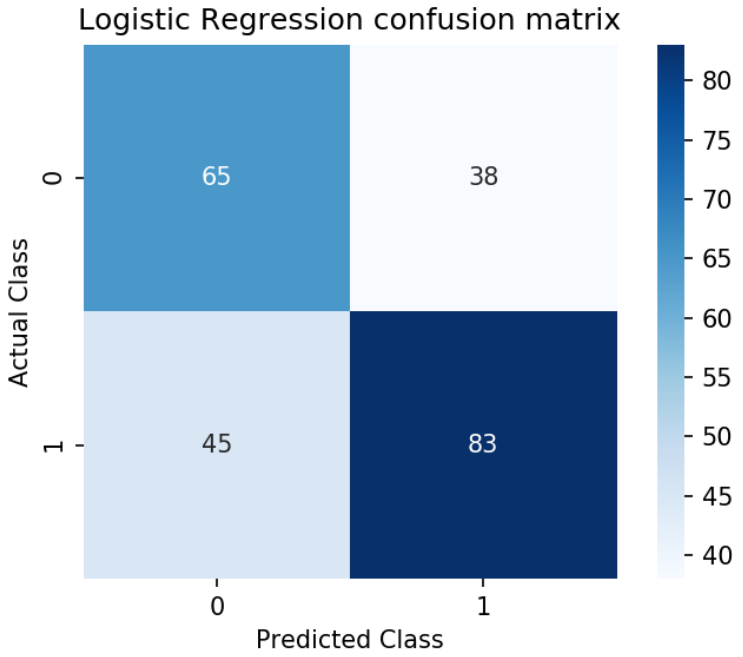
- https://www.sciencenews.org/article/future-ai-may-diagnose-eye-problems
- https://www.blaineeyeclinic.com/vision-care-minnesota/diabetic-eye-care/

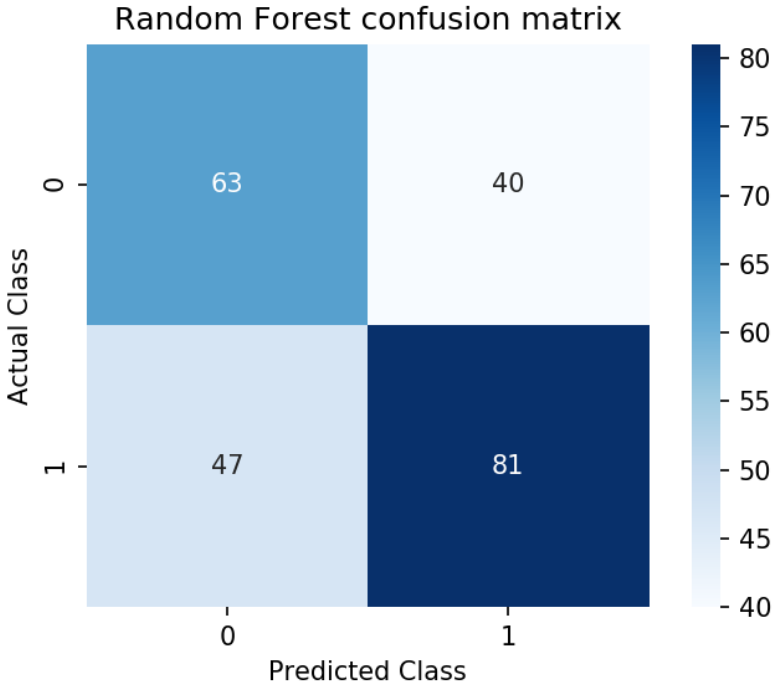
Appendix

Determining Features to Include



Confusion Matrices: LR & RF





Logistic Regression Feature Importance Graph