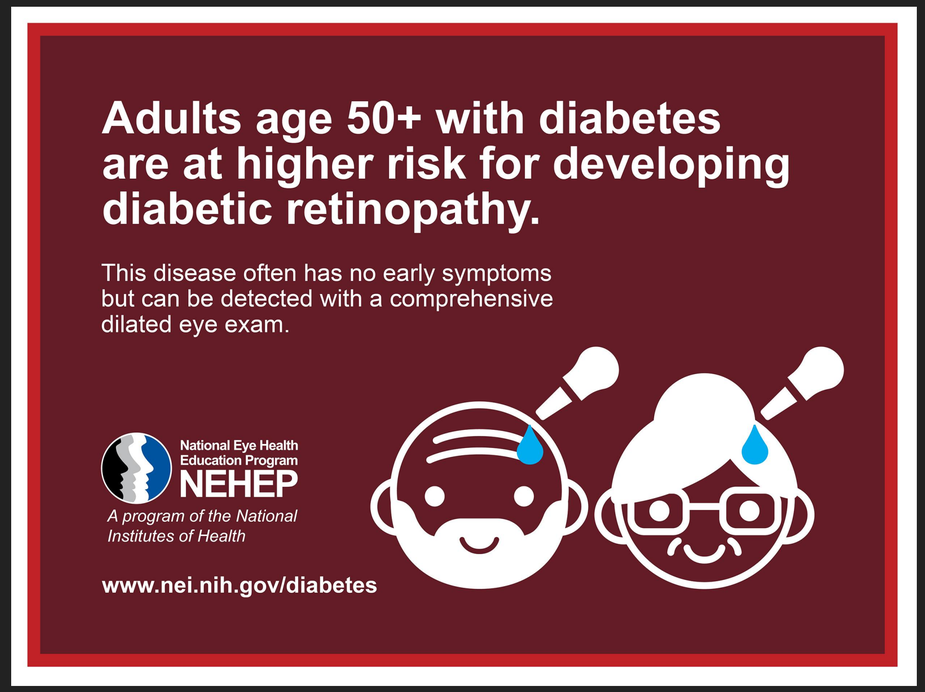


Photo by ©National Eye Institute

DEEP LEARNING PROJECT

DETECTING DIABETIC RETINOPATHY

Sandra Paredes

INTRODUCTION

- **Motivation:** Eye clinical trials generate thousands of images that need to be classified with the correct diagnosis. [1,]

- **Research Question:** How well can a neural network diagnose diabetic retinopathy from a retinal image?

- **Impact Hypothesis:** Accelerate the National Eye Institute's research evaluation of retinal clinical trial data, and streamline publishing results.

A simulated view of a person with advanced diabetic retinopathy.

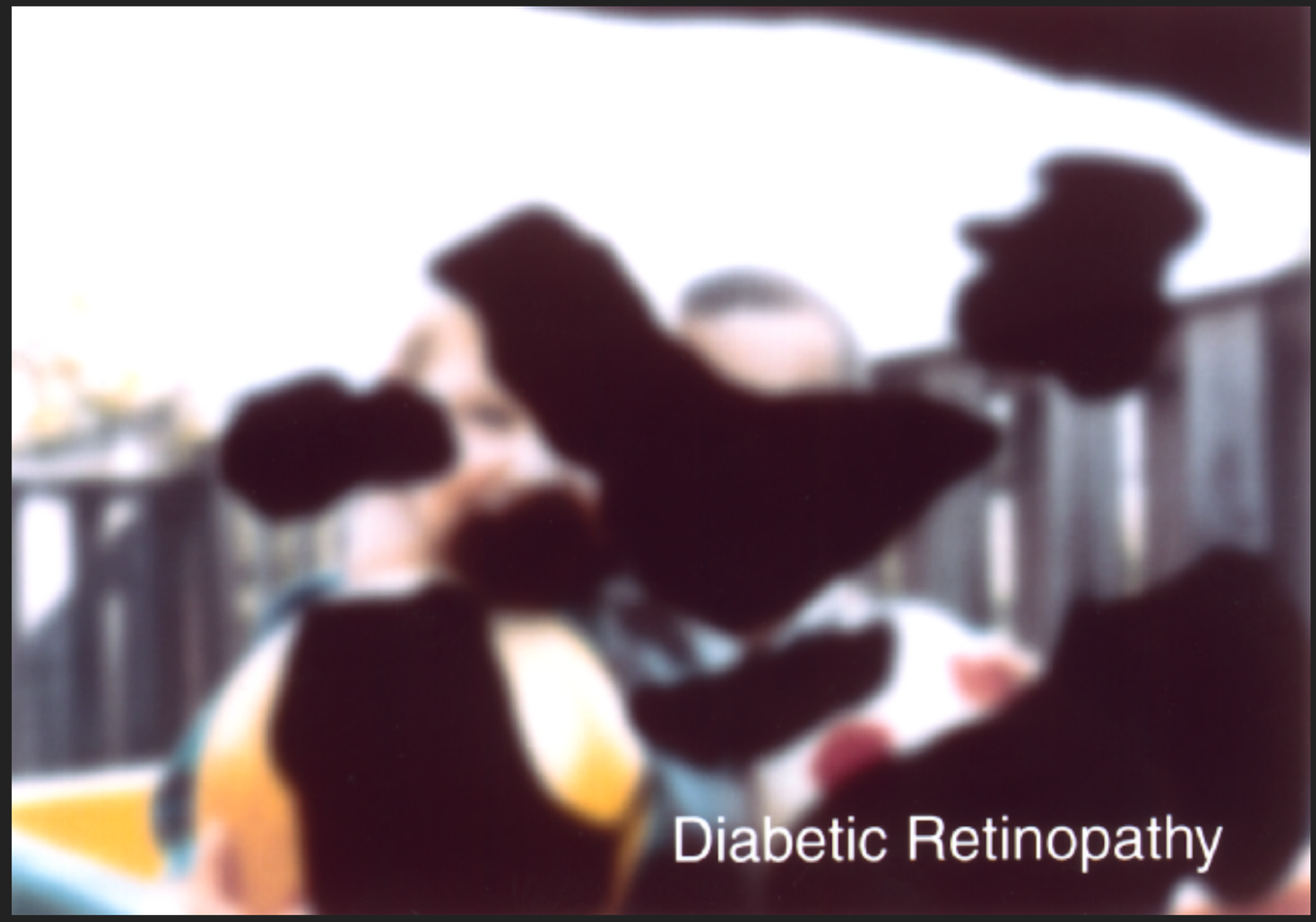


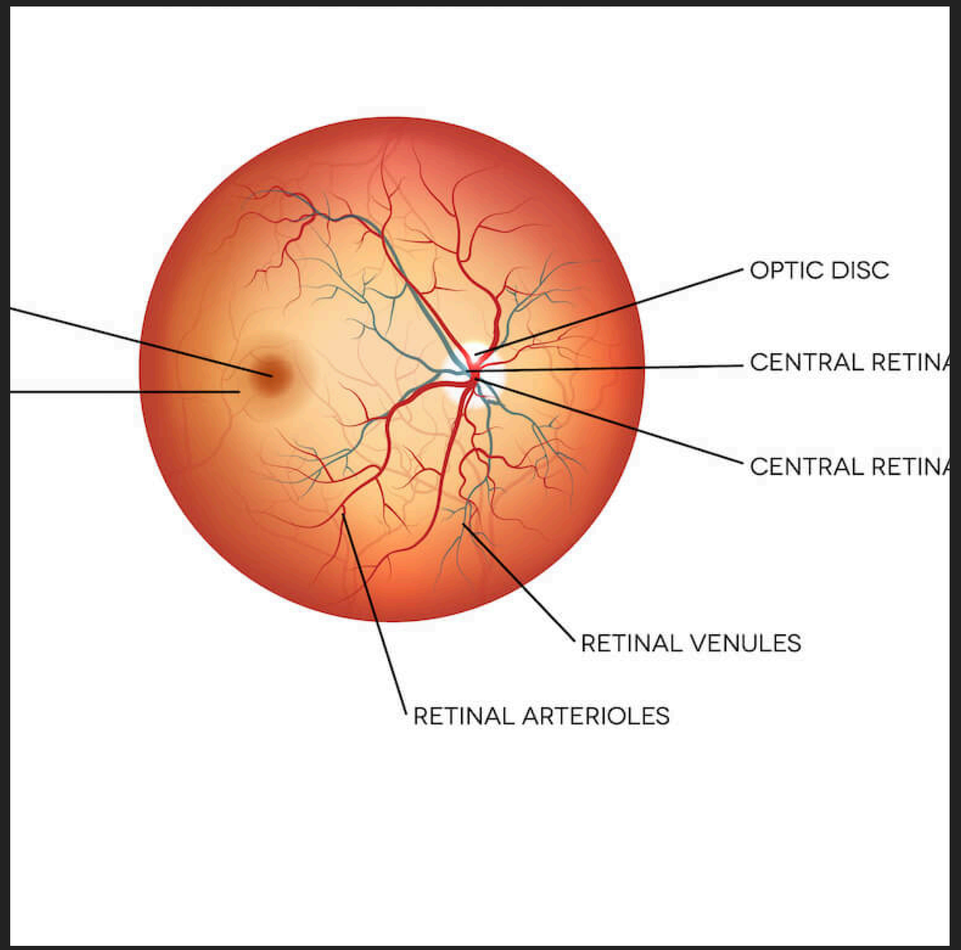
Photo by © National Eye Institute

METHODOLOGY

- **Dataset**
  - Diabetic Retinopathy 2015 Data [2]
  - Images = 35,000

Preprocessing

- Resize
- Balance classes
- ImageDataGenerator
- Data Augmentation

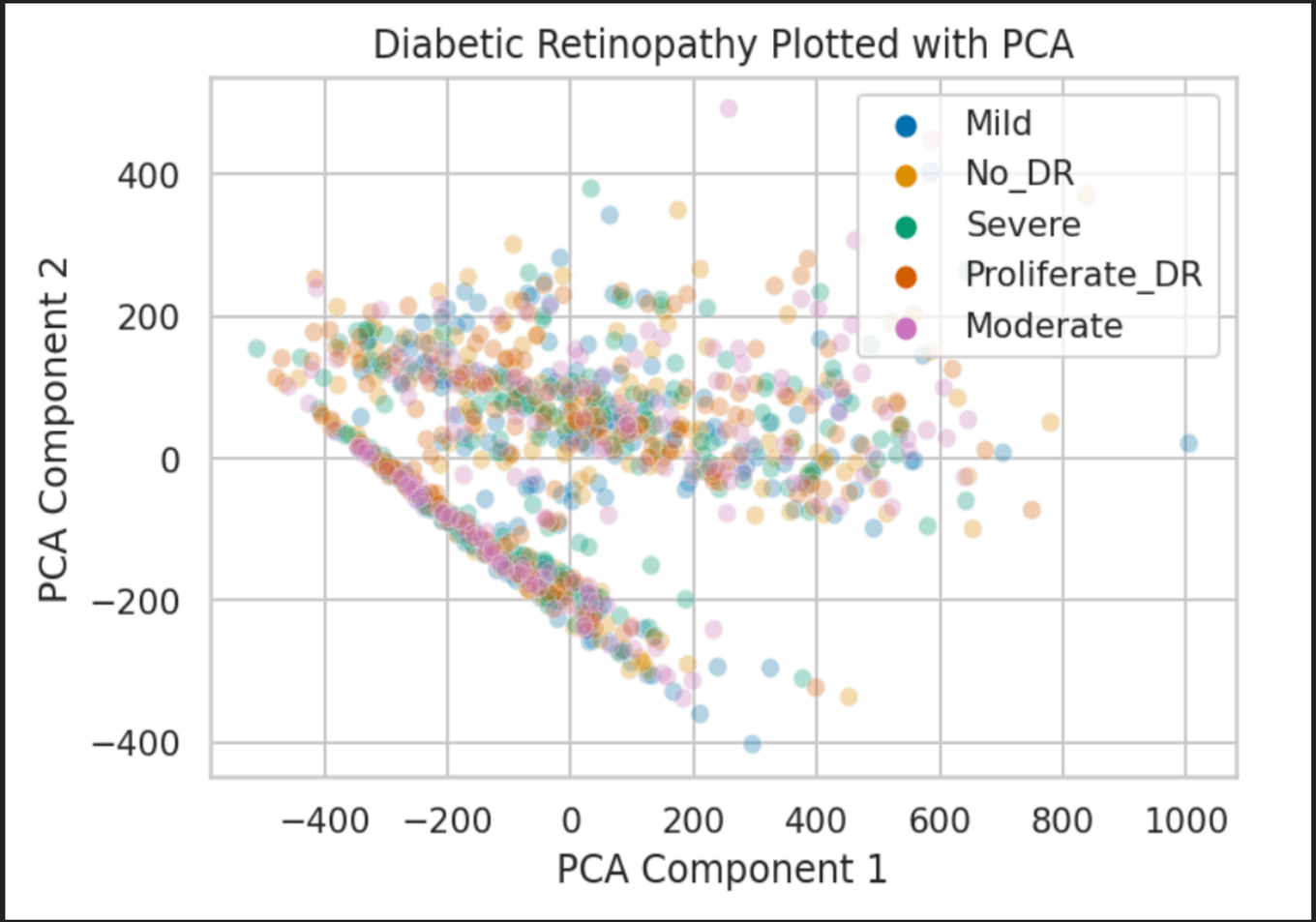


Normal Healthy Retina

METHODOLOGY

- **Model Approach**
  - Do we need a deep learning model?
  - Can logistic regression accomplish this task?
  - Deep learning may solved this task best.

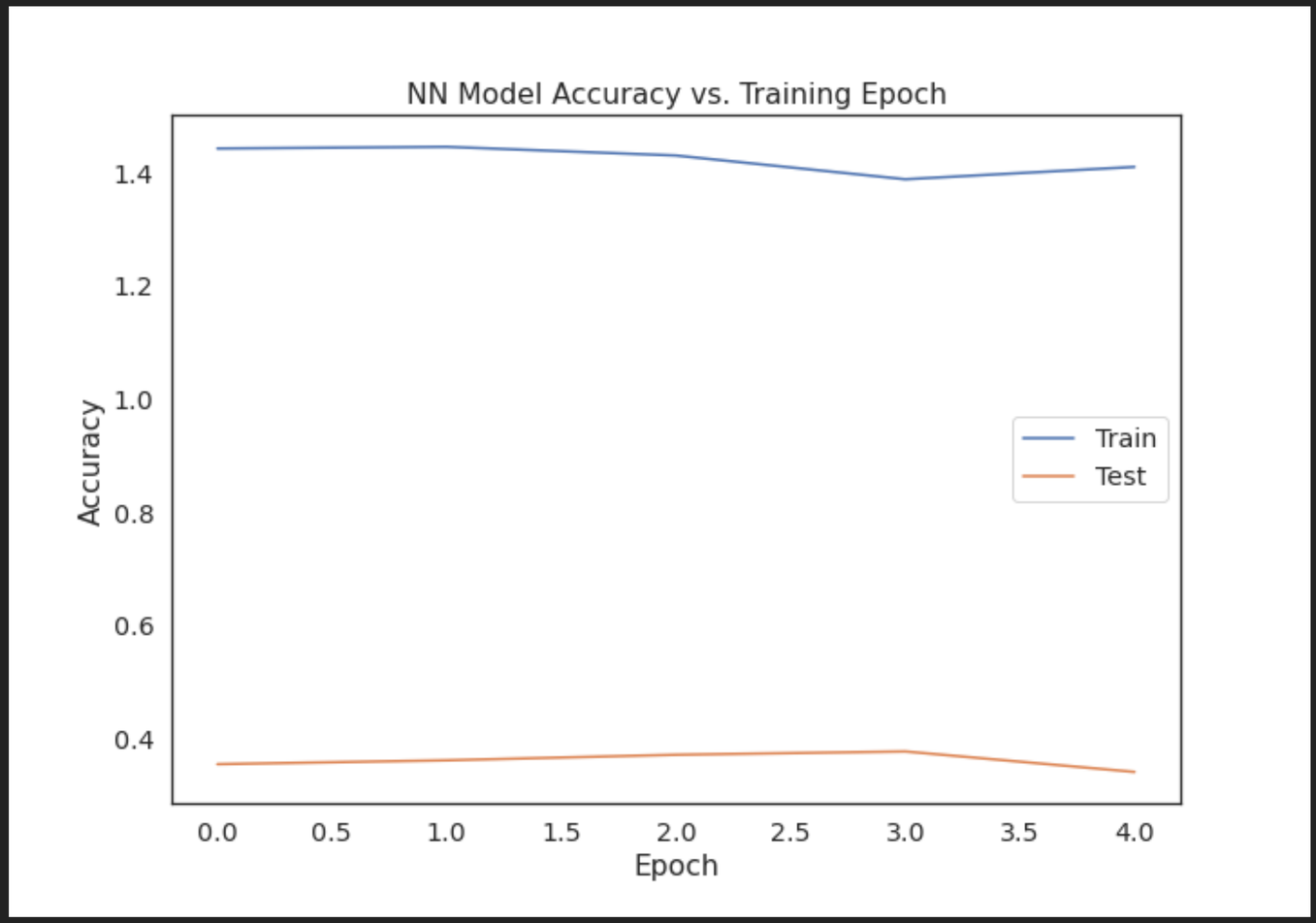
Figure 1.



RESULTS

- **Deep Learning Models**
  - Neural Network
    - accuracy = 0.3418
    - val_accuracy = 0.3555
  - Convolutional Neural Network
    - accuracy = 0.3496
    - val_accuracy = 0.5264
  - Transfer Learning: VGG16
    - accuracy = 0.3311
    - val_accuracy = 0.5127

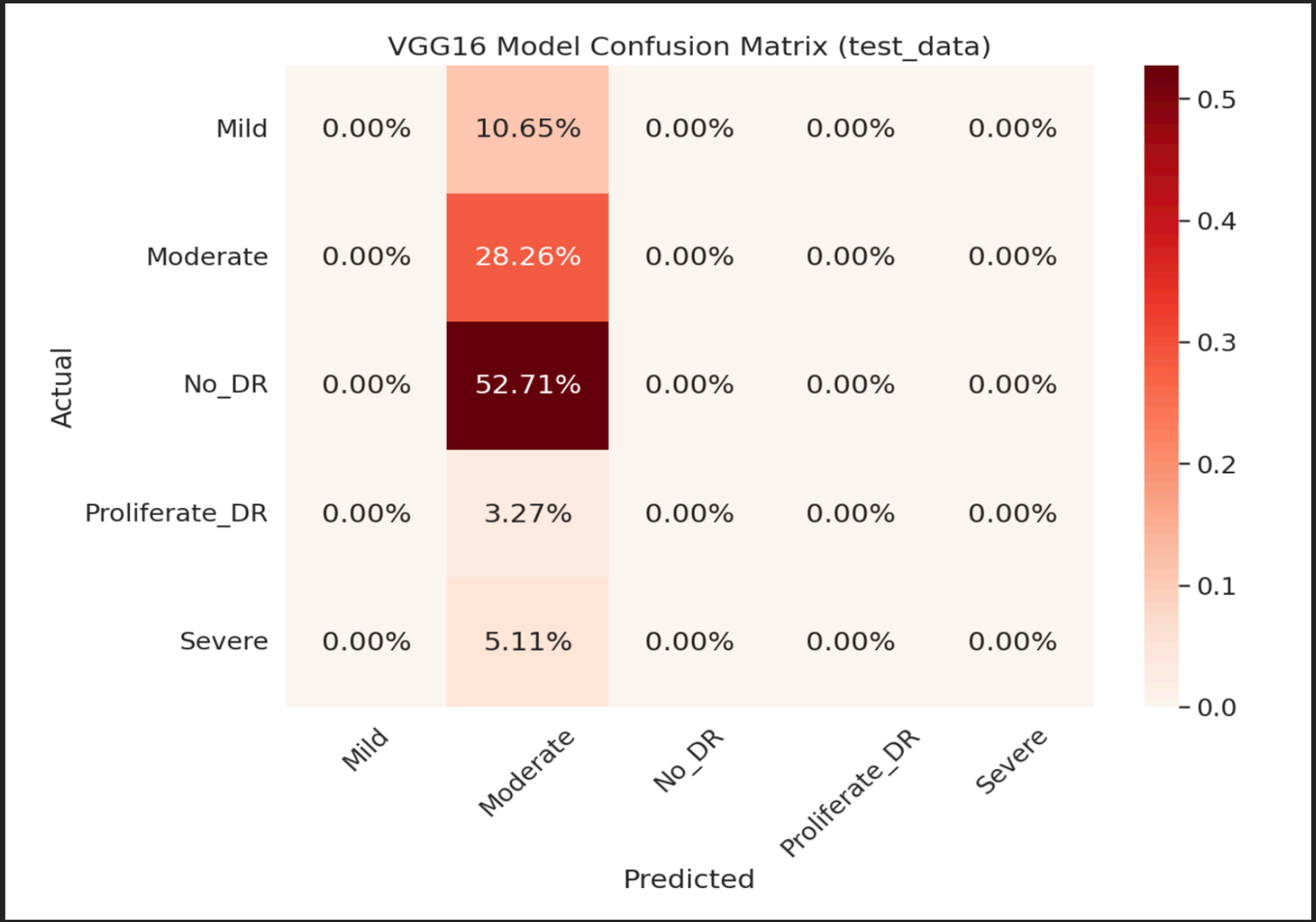
Figures 2-4.



RESULTS

- **Predictions**
  - How well did the model predict?
  - Bug in code predicts one class (the largest of the class).
  - Explains the accuracy scores on train and test.

Figure 5.



APPENDIX

- Summary, data, and slides are available at github.com/slp22/deep-learning-project

Dr. Emily Chew, Director of the Division of Epidemiology and Clinical Applications. Photo by © National Eye Institute

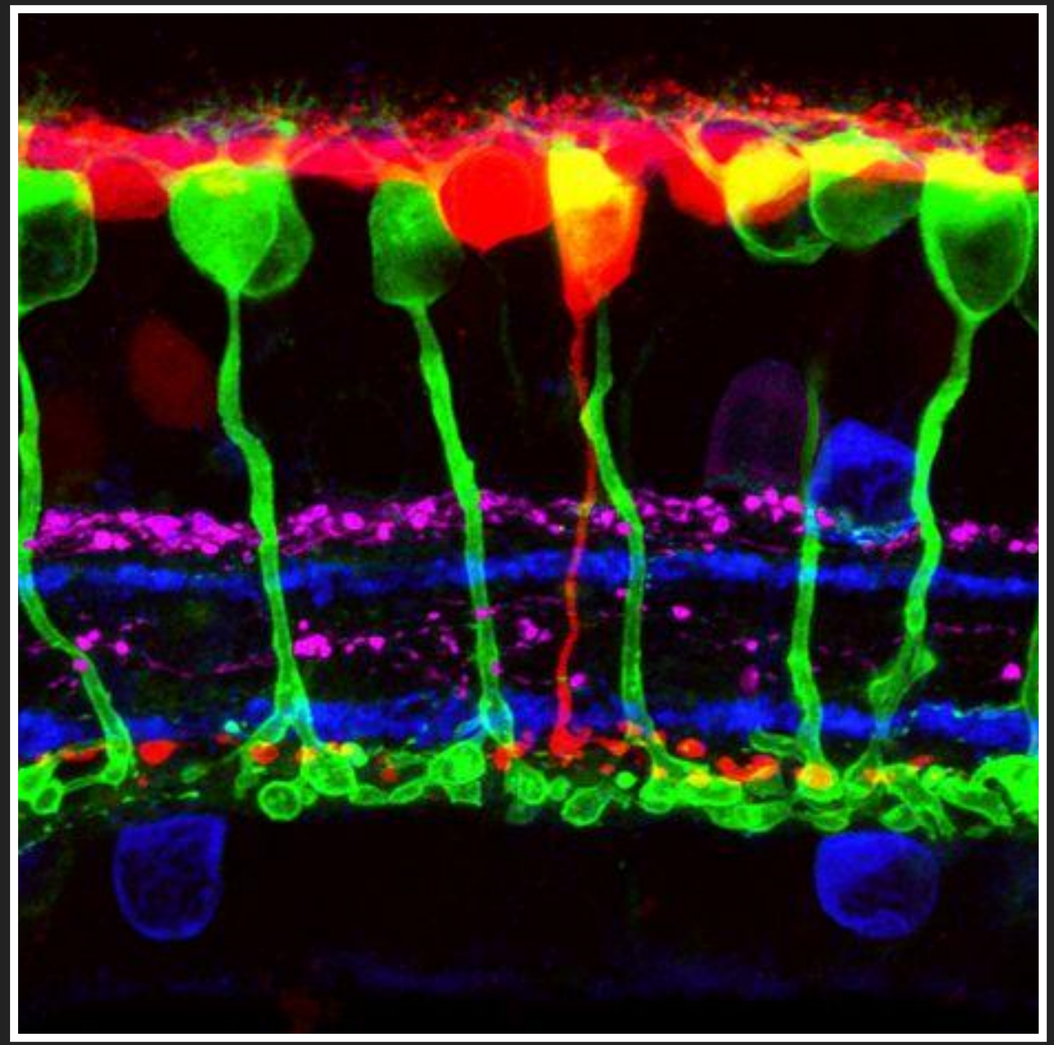
CONCLUSIONS

- **Insights**
  - ...
- **Recommendations**
  - ...
  -

Photo by ©National Eye Institute

FUTURE WORK

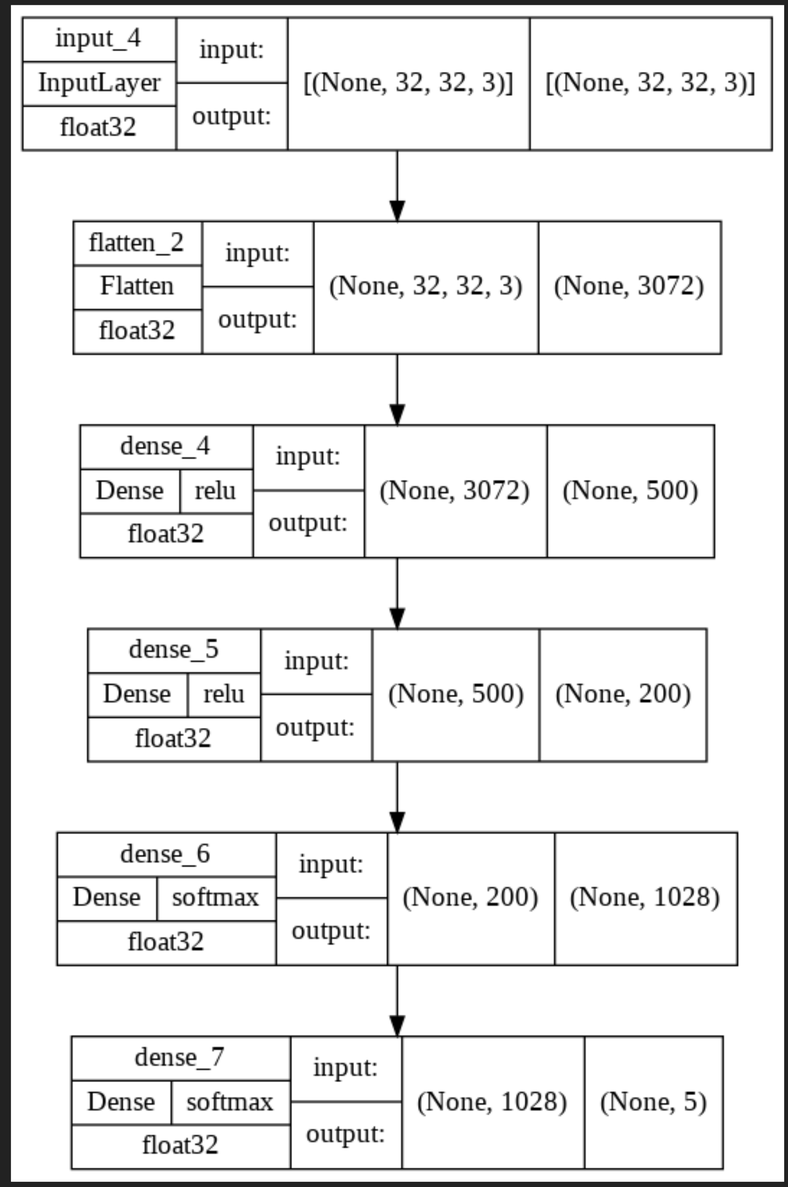
- Deep learning model



Neural circuits in the retina.
Photo by Wei Li, © National Eye Institute

APPENDIX

VGG16 Model



APPENDIX: SOURCES

1. NIH adds first images to major research database: https://www.nei.nih.gov/about/news-and-events/news/nih-adds-first-images-major-research-database
2. Diabetic Retinopathy 2015 Data Colored Resized: https://www.kaggle.com/datasets/sovitrath/diabetic-retinopathy-2015-data-colored-resized