**Biweekly Report: Diagnosis of Diabetic Retinopathy - Chenyu Huang**

**Total Work Hours: 15 hours [4.21 - 5.11]**

**Work Overview**

In the past two weeks, I continued the progress made previously, focusing mainly on the reproduction of the paper [APTOS Diabetic Retinopathy (EDA & starter)](https://www.kaggle.com/code/tanlikesmath/intro-aptos-diabetic-retinopathy-eda-starter) in the *Kaggle* competition.

During the period in last report, I got a model based on *ResNet-50* architecture through image augmentation, transfer learning and preliminary training. This two week, I mainly used GPU on the AutoDL platform to optimize and verify the model to ensure that the model has a good recognition accuracy on the APTOS2019 dataset.

**Task Progress**

1. **Model Optimization**
   1. Unfreeze all layers of the pre-trained model for fine-tuning.
   2. Plot the learning rate curve to find the learning rate that results in the fastest loss reduction rate (using the one-cycle learning rate scheduling strategy), and then export the trained model.
   3. Evaluate and interpret the model results by plotting the confusion matrix (which allows for a visual understanding of misclassified categories and those with better predictions).
   4. Optimize the threshold so that the predicted values (usually the probability outputs of the model) can be correctly classified into multiple discrete categories.
2. **Model Validation**
   1. Evaluate the classification performance using Cohen's Kappa.
   2. Optimized recognition accuracy:



Optimized threshold coefficient:



These optimization coefficients define the boundaries of categories and determine how to assign continuous values to specific discrete categories. Using the optimized threshold can improve *Cohen's Kappa score* and optimize classification performance.