Tasks I did at Baxter:

1. Ethnicity Detection
   1. Current Problem: The problem faced by the current version was, the flash was too right for some patients while some fundus seem to be not illuminated properly.
   2. Goal: To classify patients such that the flash could be adjusted for a better fundus image.
   3. Approach:

* The project consisted of 300 patient data. This data contained fundus/retina images, IR video scans till these images were captured, and a csv file comprised of various metrics which included the position coordinates of the camera, flash time, etc. There was a common csv file in the root folder for with all the patient IDs consisting of their ethnicities.
* In the beginning I performed Exploratory Data Analysis on this data by plotting the data in different forms such as plotting the value of zd wrt Ethnicity on line plots, box and whiskers plots and many such plots, and checking if there is any bifurcation in the data or if the data is getting separated wrt ethnicities.
* I saw a trend that the data could be bifurcated into two important classes, i.e. White vs Non-white, or to be more formal, it is Reflective vs Non-Reflective. The Reflective category consisted of ethnicities being White and the Non Reflective consisted of all the other ethnicities. Data was preprocessed by me to remove any errors in naming the ethnicities before this step.
* In the initial phase, I went with the zd i.e. the z-distance or the distance between the pupil and the camera. For every patient, I extracted the zd value for the right eye csv file at the last frame or the last row in the csv file. I applied Logistic Regression on this data as I saw two classes and I needed to predict the class of the data for the next patient that I saw.
* The data was split such that 70% for training while the rest for testing and was done using Sklearn’s train\_test\_split.
* The accuracy that I got on this zd vs Ethn was very low around 54%, therefore I knew it was not the easy way around. Therefore after consulting with my manager I went with the real data itself, i.e. the data from the video before the image was captured.
  1. Solution:
     + After looking into the 300 videos repeatedly for the next 2-3 days, I saw a pattern, the pattern was that people belonging to White/ Caucasian ethnicities had a more reflective fundus than those which belonged to other ethnicities.
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1. Focus Algorithm on Mira220 RGB IR Camera
2. Human Detection on Lidar
3. Training Models using DDP on Heterogeneous GPUs