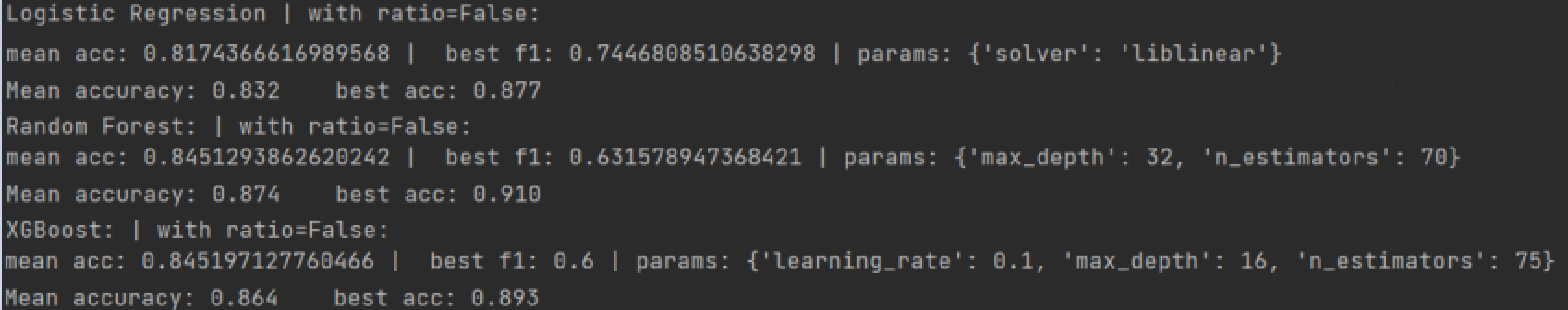
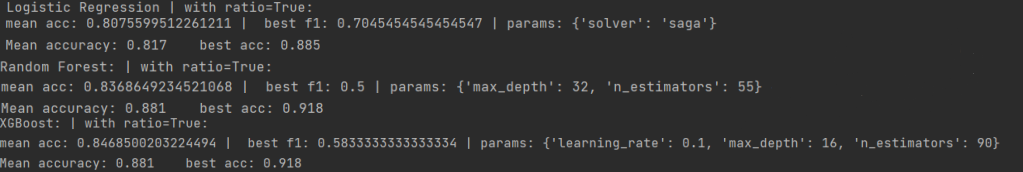
**Task 1 – Predict COVID-19 from routine blood tests:**

3. - The first new feature will be the ratio between Hemoglobin and Red blood cells () because they are strongly related with the amount of oxygen in the blood.  
 - The second new feature will be the ratio between Leukocytes and Red blood cells () which is the ratio between white blood cells (the type that fight against infections) and red blood cells.  
 - Another new feature will be the ratio between Lymphocytes and Red blood cells (), which is the ratio between white and red blood cells.  
 - Another new feature will be the ration between Monocytes and Red blood cells () which is the ratio between immune cells and red blood cells.  
 - Another new feature will be the ration between Neutrophils and Red blood cells () which is the ratio between immune cells and red blood cells.  
**Results:**

Results without new features:  
  
Results with new features:

  
The mean accuracy rate of the models are +-2% deviation from the results without the new features. However, the hyper-parameters changed.

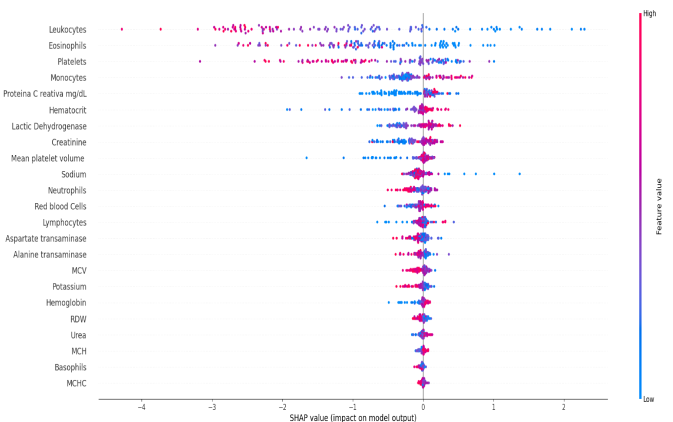
4. Results:  
LightGMB:  
  
mean accuracy is 84.1%, while the best model with f1 score of 56% with the hyper parameters:  
learning rate = 0.1, max depth = 16 and number of estimators is 85.

CatBoost:

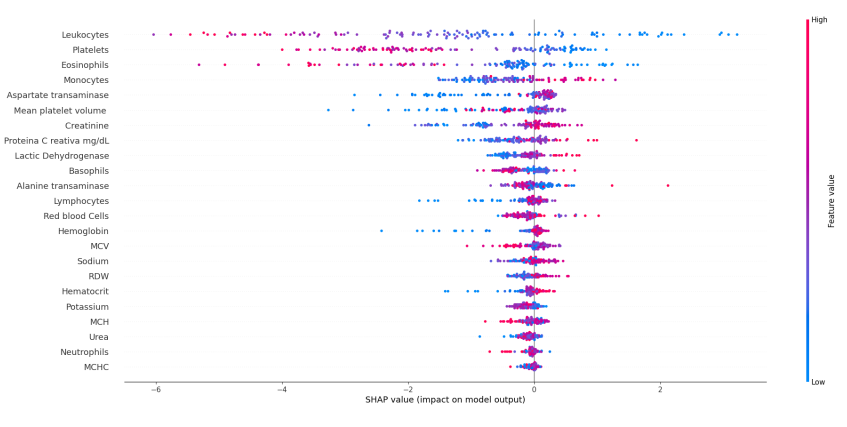


mean accuracy is 82.8%, while the best model with f1 score of 59.2% with the hyper parameter:  
learning rate = 0.05.

5. xgboost



lightGBM:



Random forest:

