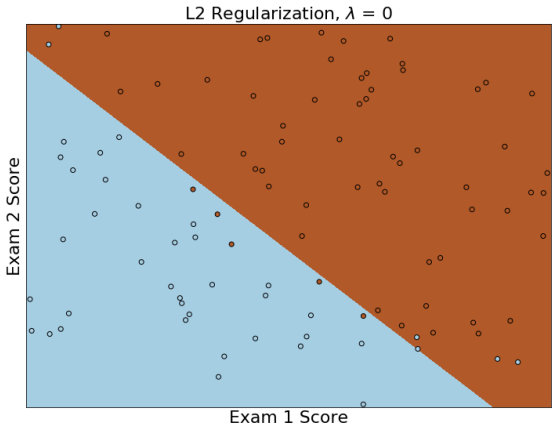
CIS 419/519: Homework 3

Jiatong Sun

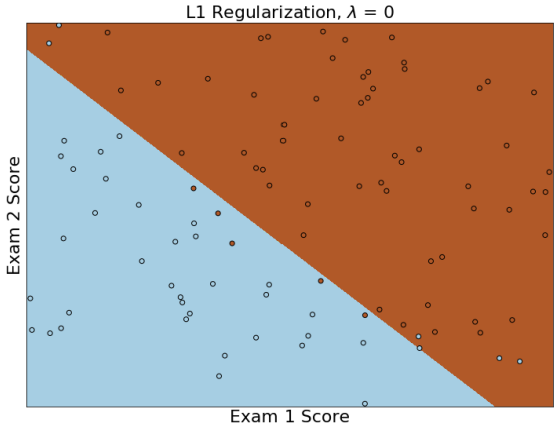
Although the solutions are entirely my own, I consulted with the following people and sources while working on this homework: $JunfanPan$

1 Logistic Regression

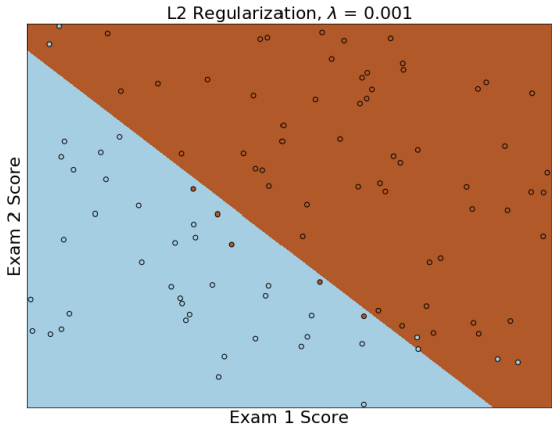
1.3 Analysis



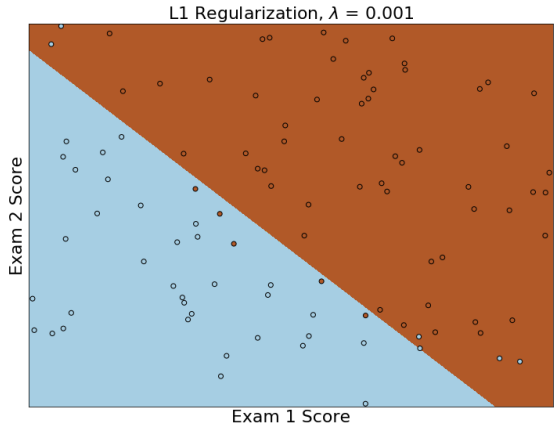
(a) $\lambda = 0, regNorm = 2$



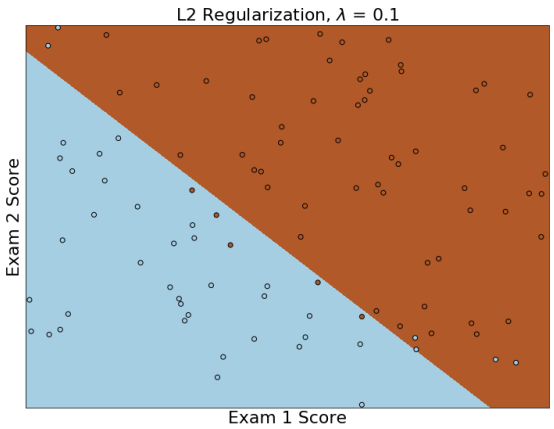
(b) $\lambda = 0, regNorm = 1$



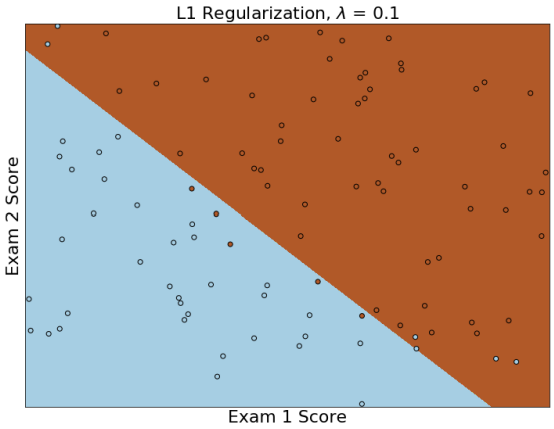
(a) $\lambda = 0.001, regNorm = 2$



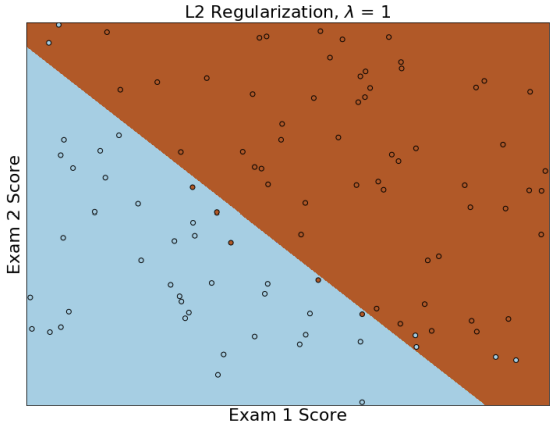
(b) $\lambda = 0.001, regNorm = 1$



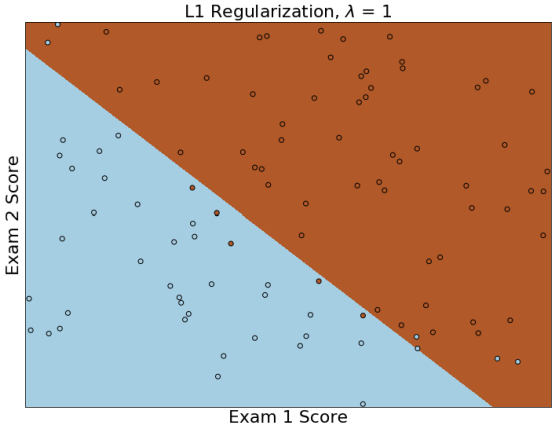
(a) $\lambda = 0.1, regNorm = 2$



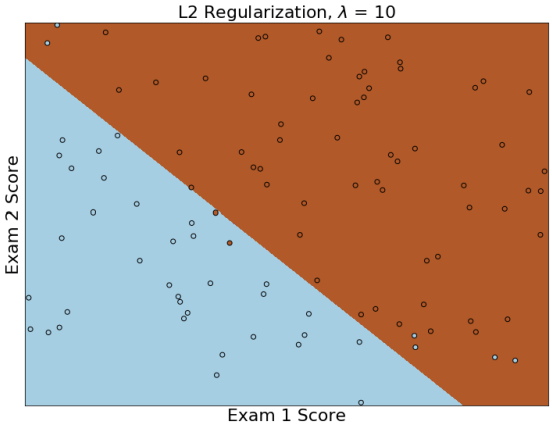
(b) $\lambda = 0.1, regNorm = 1$



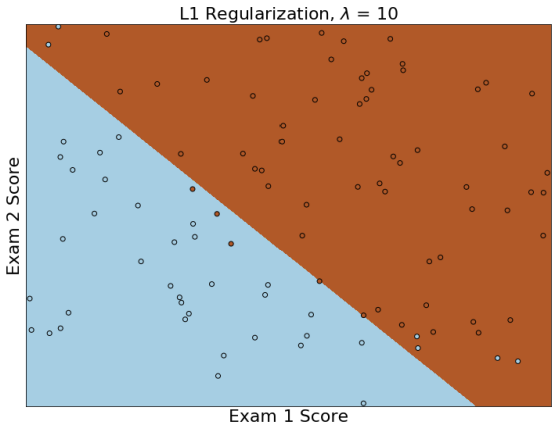
(a) $\lambda = 1, regNorm = 2$



(b) $\lambda = 1, regNorm = 1$



(a) $\lambda = 10, regNorm = 2$



(b) $\lambda = 10, regNorm = 1$

Conclusion:
As the λ increases, the border slightly moves to bottom left corner, which means more data are recognized as 1. This is because a bigger λ causes the regularization term to be bigger and the convergence to be more quick, and thus the boarder stops moving at a relatively small iteration number. For l1 and L2, when λ is small, the difference is hard to observe; but when λ is greater than 1, L2 norm converges more quickly than L1 norm and thus its boarder is more close to the bottom left corner.

2 Comparing Algorithms

2.2 Comparing Algorithms