CS-443 Machine Learning Project 1: J-D-S Team

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1 Introduction

The goal of this project is to apply machine learning methods learned in class on a real dataset. We take a strong interest in testing a lot of techniques and comparing their results. This comparison encourage us to tweak hyperparameters and check their effectiveness using cross-validation.

We do not use least_squares_SGD because we consider that it would provide us results really close to other methods we already us. Finally, we assess the following methods.

- least_squares
- least_squares_GD
- ridge_regression
- logistic_regression
- reg_logistic_regression

2 other section

This is not our report.

3 Regularized logistic regression

We implement cross-validation to optimize the values of λ and γ. λ takes values $\{1, 10, 100, 1000, 10000\}$ and γ takes values $\{10^{-6}, 10^{-7}, 10^{-8}, 10^{-9}\}$. Taking bigger values for γ results in the loss taking value *nan*. You can see the test error plotted against λ in 1, each line corresponds to a value of γ. Other parameters are:

```
max_iters = 3000
k_fold = 3
w_initial_raw = [0.0, 0.0, ..., 0.0]
```

This outputs the values for λ and γ that minimize the test error. These values are:

$$\lambda = 10$$
$$\gamma = 10^{-6}$$

Then we run the regularized logistic regression algorithm on the whole training with these two values but with $max\_iters = 30000$ to obtain a good w vector.

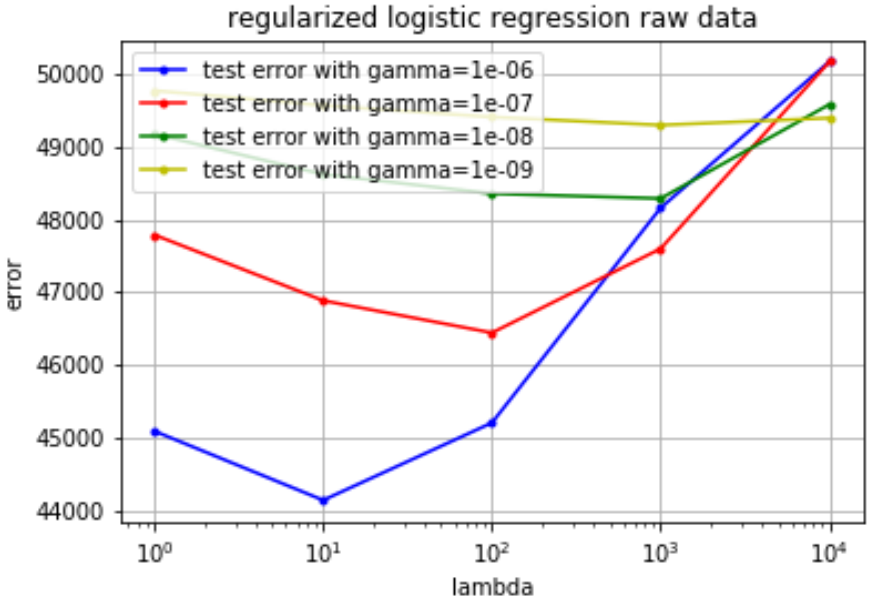

Figure 1: Regularized logistic regression - HP optimization