

## CS6001 Assignment 6: Classification

**This project will implement the logistic regression to classify face images from background images. Two datasets are uploaded (one for training and the other for testing).**

- (1). Implement the Logistic Regression method.
- (2). Implement the Bayesian Logistic Regression method.
- (3). Implement the Dual Logistic Regression method.
- (4). Implement the Dual Bayesian Logistic Regression method.
- (5). Implement the Kernel Logistic Regression method.
- (6). Implement the Relevance Vector Logistic Regression method.

For each of the above method, learn the parameters from the training dataset, and infer the label of test images (face or background).

Evaluation metric:

- (1) Miss detection:  $\frac{1}{N_{face}} \sum_{n=1}^{N_{face}} |\hat{y}_n - y_n^{GT}|$  where  $\hat{y}_n$  is the inferred label on test image n and  $y_n^{GT}$  is the ground truth.  $N_{face}$  is the total number of face images in the testing dataset.
- (2) False alarm:  $\frac{1}{N_{bg}} \sum_{n=1}^{N_{bg}} |\hat{y}_n - y_n^{GT}|$  where  $\hat{y}_n$  is the inferred label on test image n and  $y_n^{GT}$  is the ground truth.  $N_{bg}$  is the total number of background images in the testing dataset.

You can tune some parameters in the code such as  $\sigma_p$  in the Bayesian approach,  $\lambda$  in the Gaussian Kernel method,  $\nu$  and threshold in the Relevance Vector Logistic Regression.

**Upload running MATLAB codes and a written report to Canvas by the due date & time including**

- a) Brief summary of what you think the project was about,
- b) Brief outline of the algorithmic approach,
- c) Pictures of intermediate or final results that convince us that the program does what you think it does.
- d) Any design decisions you had to make and your experimental observations. What do you observe about the behavior of your program when you run it? Does it seem to work the way you think it should? Play around a little with different setting to see what happens. Note, your open-ended exploration is highly valued.