CS6001 Assignment 5: Regression

This project will implement the regression to infer the rotation of a ring image. Two datasets are uploaded (one for training and the other for testing). Some samples are below:

Image			
Filename	"0.35.jpg"	"3.17.jpg"	"5.00.jpg"
Ground truth on the rotation angle	0.35 /3.14*pi	3.17 /3.14*pi	5.00/3.14*pi

(1). Implement the linear regression method, learn the parameters from the training dataset, and infer the rotation of test images;

(2). The input image is 100*100. Therefore the feature length (D=10000) is too long, which may crash your Matlab. You can do some feature selection, i.e., use a less number of features.

(3). Based on the linear regression and selected features, implement its Bayesian solution (i.e., add a regularization term).

(4). Based on the selected features, Implement the nonlinear regression (e.g., polynomial regression) using the regularization.

(5). Without using the feature selection, implement the dual nonlinear regression with regularization.

Evaluation metric: $\frac{1}{I}\sum_{i=1}^{I}|\hat{\theta}_i - \theta_i^{GT}|$ where $\hat{\theta}_i$ is the inferred angle on test image i and θ_i^{GT} is the ground truth. I is the total number of test images?

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.