Pattern Analysis Spring 2006
Problem Set Three

Due Friday, March 24, 2006

1 Theory

Solve all the following problems:

1. Choose 4 vectors of length 6 and generate even and odd data sets from these. Compute the eigenvectors of the ensemble averaged covariance matrix for the even, odd and symmetry extended data set and compare.

2. Show that the solutions $\psi^{(j)}$ to the generalized singular value problem are orthogonal in either of the following senses:

$$(\psi^{(i)})^T X^T X \psi^{(j)} = \lambda_i \delta_{ij}$$

and

$$(\psi^{(i)})^T Q^T Q \psi^{(j)} = \lambda_i \delta_{ij}$$

3. 4.16

4. 4.17

2 Computing

Problem 1.

- Using the code provided, compute the first canonical correlation coefficient taking the cats as the data set Y and the dogs as the data set X. Show the vectors a and b as unvecced images, A and B, respectively.

- Compute the Fourier spectrum of the images A and B and compare with the Fourier spectra of the first eigendog and eigencat.

Problem 2. Propose a method for using CCA as a two class classifier and apply it to the cats and dogs data.