

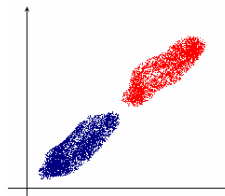
Name:

Student ID#:

Statistical Pattern Recognition (CE-725)
Department of Computer Engineering
Quiz #3 solutions - Spring 2010

1. (2 points) When the results of data projection on Fisher direction and data projection on first component of PCA are the same?

Solution: When the data have most separability in the direction with the most variability:



2. (6 points) Which of the following would be a good objective function to use instead of Fisher's one and which of them not? Give 1 sentence explanations.

$$J(v) = \frac{(\mu_1 - \mu_2)^2}{\sigma_1^2} + \frac{(\mu_1 - \mu_2)^2}{\sigma_2^2}$$

Good one: maximizing $J(v)$ maximizes the means distances and minimizes the within-class variabilities.

$$J(v) = \frac{(\mu_1 - \mu_2)^2}{\sigma_1^2 / \sigma_2^2}$$

Bad one: maximizing $J(v)$ maximizes the class 2's within-class variability.

$$J(v) = \frac{\sigma_1^2 * \sigma_2^2}{(\mu_1 - \mu_2)^2}$$

Good one: minimizing $J(v)$ maximizes the means distances and minimizes the within-class variabilities.

3. (2 points) Consider a 1000-dimensional data and 10-classes classification problem. How many dimensions will be obtained after using Multiple Discriminant Analysis (MDA)?

Solution: 9 dimensions.