Medical Image Analysis Exercises: Session 10

http://physics.medma.uni-heidelberg.de/cms/

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52: Gaussian mixture distribution

a: sample generation

- reset the random number generator to the startup state
- generate 100 samples of group 1 with a bivariate normal distribution with mean `(0,0)` and standard deviation `(2,2)`
- generate 100 samples of group 2 with a bivariate normal distribution with mean `(20,0)` and standard deviation `(2,2)`
- generate 100 samples of group 3 with a bivariate normal distribution with mean `(10,5)` and standard deviation `(2,2)`
- create a scatter plot of the samples with the group information

b: clustering with Gaussian mixture distribution

- partition the sample points into `k` clusters with `k=2`, `k=3` (twice) and `k=4`
- display 4 axes in one figure, including 4 different clustering outputs with the locations of the means

reference: https://de.mathworks.com/help/stats/fitgmdist.html

55: discriminant analysis classifier

a: sample generation

- reset the random number generator to the startup state
- generate 200 samples of group 1 with a bivariate normal distribution with mean `(2,2)` and standard deviation `(2,2)`
- generate 200 samples of group 2 with a bivariate normal distribution with mean `(6,8)` and standard deviation `(2,2)`
- create a scatter plot of the samples with the group information

b: linear discriminant classifier

- take the samples with odd indices in each group as training samples
- train the discriminant analysis classifier with the training samples with the linear discriminant (using `fitcdiscr()`)
- plot the training samples together with the separation line and display the classification error

c: quadratic discriminant classifier

- train the discriminant analysis classifier with the training samples with the quadratic discriminant (using `fitcdiscr()`)
- plot the training samples together with the separation line and display the classification error

d: discriminant analysis classifications

- take the samples with even indices in each group as testing samples
- perform a linear classification on the test set
- plot the test samples together with the separation line and display the classification error
- perform a quadratic classification on the test set
- plot the test samples together with the separation curve and display the classification error