# CS 736 : Assignment 5

Instructor : Suyash P. Awate

Maximum Marks: 50
Due Date : 18 Apr 2015, Saturday, 11:55 pm

Please read, carefully, the instructions for submission at :
http://www.cse.iitb.ac.in/%7Esuyash/cs736/submissionStyle.pdf

**5 marks** are reserved for submission in the described format.
Items with **0 marks** are a necessary part of the assignment, without which the assignment won't be graded.

1. (45 marks) Shape Analysis on Simulated Shapes.

   Download the dataset of shapes from
   http://www.cse.iitb.ac.in/%7Esuyash/cs736/assignmentShapeAnalysis.mat.zip
   that contains 2D elliptical shapes represented as pointsets.

   Implement an algorithm (covered in class lectures) for computing the shape mean and the principal mode of shape variation.

   Implement the following functionality as part of the shape-analysis algorithm:

   (a) (5 marks) Code to align two pointsets of equal cardinality via similarity transformations.

   (b) (5 marks) Code to find the optimal shape mean, within every iteration.

   (c) (5 marks) Code to find all the modes of shape variation.

   Report the following:

   (a) (0 marks) Show a plot of the initial pointsets, as given in the dataset. You may randomize the color for each pointset.

   (b) (10 marks) Show a plot of computed shape mean, together with all the aligned pointsets.

   (c) (10 marks) Show a plot of the variances (eigenvalues) along each principal mode of shape variation.

   (d) (10 marks) Show a plot of the computed shape mean, all aligned pointsets, as well as two other pointsets depicting the principal mode of shape variation around the mean ($\pm$ 2 standard deviations around the mean).