MAT 116E Advanced Scientific and Engineering Computing

Lab-5

Q-1. The special set of $n \times n$ real symmetric positive semidefinite matrices, denoted by S_+^n is called a convex cone. Consider the special case S_+^2. For a symmetric matrix

$$A = \begin{bmatrix} x & y \\ y & z \end{bmatrix}$$

The conditions $y^2 \geq xz$ and $x + z \geq 0$ makes A to positive semi-definite matrix. Plot the boundary of the corresponding convex cone, i.e.

$$y^2 = xz \ \ where\ x \geq 0\ and\ z \geq 0$$

in $xyz - space$ in MATLAB.

NOTE: You can use $view([45\ 45\ 10])$ command to adjust azimuth, elevation and skew of the plot, respectively.

Q-2. Given a two points x_1 and x_2 in a real vector space, a convex combination of these points is a point of the form

$$x = \alpha x_1 + (1 - \alpha)x_2$$

where the real number $\alpha \in [0,1]$.

By inverstigating ***imread*** and ***image*** functions, write a MATLAB code which reads two images(You can use built-in demo images of MATLAB like 'peppers.png' and 'tape.png'), takes α value from the user by standart input to create the third picture which is a convex combination of these pictures and plots the third picture.

NOTE: If the image sizes are not compatible, use the min function to find the minimum number of rows and columns as it is described in the lecture.