CS6870: Digital Video Processing - Assignment 2

Due on 11th February, 2013

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Image Stitching

I have implemented *Image Stitching* using the *Lucas Kanade Tracker* approach, coupled with the Pyramid appraoch and an initial SSE translational transform approximation, using the OpenCV framework in C++. The following is a detailed explanation of my approach.

The Initial Approximation : First the images are loaded and converted to grayscale. The General approach is something like this. Images are taken one at a time, and are stitched onto a global canvas, which keeps expanding in size according to the transformations applied. For each image, an initial estimate of its position on the canvas is determined by finding the translational point at which the sum of squares error is the least. This estimate is done over a gaussian blur on the image.

The Projective Transform : Once the initial estimate of the position of the current image on the canvas is obtained, the exact projective transform is then calculated using the Lucas Kanade Algorithm. The error at each stage is calculated, and the parameters of the projective transform are tweaked until convergence is achieved in some sense.

The Pyramid Approach : Though the SSE estimation is a decent estimation, it doesn't do very well, and only helps in roughly estimating the location of the image on the canvas. So, in order to obtain the exact transform, a pyramid approach is used, in which a pyramid of images are created with different levels of gaussian blurs, and the estimation of the projective transform obtained at some blur level, is fed as the initial estimate during the estimation of the projective transform at a lower blur level. This yields very good results.