Journal For Winter Quarter 2008

Sruthi Devarachetty

1 Week1 - 01/06/08 to 01/14/08

In this quarter we are continuing with the Sets project. We are investigating different perspectives to improve upon we already have. In the first week of the quarter each of us have been given a task to work upon. I have been given a trigonometric identity,

$$\sin(\sum_{j=1}^{d} x_j) = \sum_{j=1}^{d} \sin(x_j) \prod_{k=1, k \neq j}^{d} \frac{\sin(x_k + \alpha_k - \alpha_j)}{\sin(\alpha_k - \alpha_j)}.$$

I have to use this trigonometric identity to plot points with a higher rank. I need to sample the function in a certain interval and try to get the points in a form that can be used to yield the desired plots and result.

2 Week2 - 01/15/08 to 01/22/08

This week I started working on implementing the sine function to obtain the desired results. First I started working on the theoretical background behind the actual implementation and also on the implementation. There are two ways to obtain the tensor product of the vectors. The first way which can be a little complicated is taking the integral of the two functions whose dot product is to be determined. The second method which is simpler but may not be an optimal one is sampling the function at equally spaced points.

3 Week3 - 01/22/08 to 01/29/08

This week I wrote the code to calculate the integral of the product of two sine function, which is required for the calculation of the sine function dot product.

4 Week4 - 01/30/08 to 2/5/08

This week I continued with the implementation of the dot product. I have to do some more debugging for the dot product of the integral of the sine functions that are the basepoints and the generated point to be projected, which is required for plotting the pictures.

5   Week5 - 02/6/08 to 2/12/08

This week I finished coding the part required to calculate θ, the projection angle and also generating random target points to be projected. Now I am working on the validation testing and other finer details before plotting the images. I got the basic images showing the basepoints.

6   Week6 - 02/13/08 to 2/20/08

This week I worked on generating Homotopy points. The randomly generated target points seem to be far away from the plane consisting of the three basepoints. The homotopy between each pair of basepoints resulted in better images. The reason for the randomly generated target points being being far away from the plane is that sine is an alternating function. In order to compute the dot product we multiply the sine functions and integrated the result, which sometimes may result in the sine functions canceling each other and so the result is zero. To avoid the probelm I normalized the coefficients of the points generated. This resulted in better images with more points lying close to the plane.

7   Week7 - 02/20/08 to 2/27/08

This week I was preparing for the presentation of the SETS project group. I generated several images to be presented in the class.

8   Week8 - 02/28/08 to 2/04/08

This week I spent some time cleaning the code and doing some validation tests to ensure that everything is working as expected and generated a lot of better images. The target points were generated using the linear combination of the basepoints where the α, β, γ were chosen to be random where α and β are between 0 and 1 and gamma is 1-$(\alpha + \beta)$ and this resulted images that contained the target points in the plane of the three basepoints. Now I have to generate the images by plotting the points in a range of for eg. -1 to 2.

9   Week9 - 03/05/08 to 3/11/08

This week I worked on finishing up the final report.