Week 4 Report (6/30/16)

Problems Encountered and Revised

Initially, my vectors were determined with quadrant-based calculations. These vectors were wrong because they misrepresented the vector magnitude and direction. The fix was to use Basis Field Summation which used defined Jacobian matrixes to calculate vector values. However, my matrix multiplication had to be fixed from left to right multiplication.

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| C:\Users\ootut\AppData\Local\Microsoft\Windows\INetCache\Content.Word\Original.png | C:\Users\ootut\AppData\Local\Microsoft\Windows\INetCache\Content.Word\RevisedSource.png |
| The original Source element which was vectored by comparing quadrants. | Revised Source using Basis Field Summation. |

Singular element coordinates are stored in integer values which presented a big problem for weight and distance calculation. Currently, the coordinates for the representative center and their actual center are misaligned because of precision error from producing a floating point number with an integer. My solution for this is to restructure how my program stored its data type variables. This also includes changing how sample points are initialized and represented.

Weights and Formalization

After finishing up the vectorization, I included weights into my calculation for vector values. The first problem was that the vectors were very short. After our meeting, we found that the distance values were very large which made our inverse weight values small. The distance is measured through pixels so the weight formula had to be manipulated by to account for the extra size. It is still unsure but I may need to change the decay weight depending on how the elements interact with each other. Weights are increased by a hundredfold. Vectors were also formalized to make the visualization simple and helps focus more on the direction of the vectors. This was done by dividing each *VX* and *VY* component by its distance from each sample.

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| Un-normalized Sink Element | Normalized Sink Element | Basis Field Summation Interaction |
|  | C:\Users\ootut\AppData\Local\Microsoft\Windows\INetCache\Content.Word\sinknormalized.png | C:\Users\ootut\AppData\Local\Microsoft\Windows\INetCache\Content.Word\radialbasis.png |

Conclusion

There was a problem with my variable naming that made the readability of my code confusing. This led to calculation errors being made. My row and column values were labeled as ***i,j*** instead of an intuitive label like ***x,y***. Changes in the *paintComponent* need to be made to account for floating point values. I will continue using the debug tool to more effective fish out any more calculation errors I may have made.