Journal of David Avornyo
DSoTA - FALL 2015 Semester

January 7, 2016

1 Week of September 29 - October 6, 2015

Xue gave the group a presentation on her project she has been working on - Nonsymmetric Critical Points. She really did a great job of it as her presentation skills were very good. It was a very technical and challenging topic and I had problem of really understanding what the material was about.
However, the one thing I did manage to pick out was:

- Householder Method - which is widely used for diagonalization of symmetric matrices and for transforming non-symmetric matrices.

I do hope in time I become more comfortable with the terminologies and methodologies used in our discussions.

2 Week of October 6 - 13, 2015

Nate gave a presentation to the group as a dress rehearsal for his upcoming SIAM presentation in Atlanta. The project was titled the ALS Variants for Tensor Approximation. It was a very good presentation but I found it very difficult to grasp as it was very technical. Some of the things I picked out and tried to read about were:

- Damping
- Greasing
- Tikhonov Regularization etc..

3 Week of October 13 - 20, 2015

Dr Young gave a crash course on Dynamical Systems. Some of the important concepts mentioned where:

- Continuous and Discrete Dynamical Systems
- Fixed/Stationary Equilibrium points
- Asymptotically stable points

This past week I also explored a SIAM journal titled 'EXPLOITING SYMMETRY IN TENSORS FOR HIGH PERFORMANCE: MULTIPLICATION WITH SYMMETRIC TENSORS' for my MATH 5600 project.
I chose that paper because it is related to Tensors and I hope to get a better grasp on Tensors by exploring that paper.
The main motivation behind the paper was to explore how ideas from matrix computations can be extended to the field of tensors. Specifically, the paper focuses on exploring how exploiting symmetry in matrix computations extends to computations with symmetric tensors, tensors whose entries are invariant under any permutation of indices, and exploring how block structures and algorithms extend to computations with symmetric tensors.

4 Week of October 27 - November 3, 2015

Dr Mohlenkamp led a discussion on how to locally measure how "good" a point is when attempting to minimize a function using gradient flow. He presented three arguments and asked us to critique each. What he sought to argue was that

$$S(x) = \frac{f(x)}{||\nabla f(x)||_2^2}$$

was the right thing to do not

$$\frac{f(x)}{||\nabla f(x)||_2^2}$$

This past week I have been doing some research on the SIAM journal titled 'EXPLOITING SYMMETRY IN TENSORS FOR HIGH PERFORMANCE for my final MATH 5600 project.
I read a little about the FLAME Project spearheaded by The University of Texas at Austin, which the authors heavily borrowed. In brief, the aim of the FLAME project is to transform the development of dense linear algebra libraries from an art reserved for experts to a science that can be understood by novices and experts. The key insight that enables the FLAME methodology is a new, more stylized notation for expressing loop-based linear algebra algorithms. This notation closely resembles how algorithms are naturally illustrated with pictures. Other high performance libraries referenced in the paper were:

- BLIS
- libFLAME and
- Elemental.

5 Week of November 17 - November 24, 2015

Dr Young led a discussion on analysis of ALS in diagonal valleys. This was a very tough topic to relate to since most of the concepts were new to me.

6 Week of November 24 - December 1, 2015

Nate led a presentation where he gave us all an in depth description of her progress this semester and status of her project. He gave some background to his presentation "ALS Variants for Tensor Approximation" in Atlanta and other projects he was working on.

7 Week of December 1 - December 8, 2015

This was our last meeting of the Fall semester.
Similar to last week, it was Xue's turn to give us a presentation of her progress this semester and status of her project. Most of it was based on her work on the project Nonsymmetric Critical Points. It was a thorough and well delivered presentation.

8 General Remarks

All in all, the DSoTa meetings for the semester where interesting but very challenging academically. Most of the topics under discussion where very technical and I struggled to keep up and could not contribute much during discussions.
It was an intellectually stimulating exercise though. I picked up a couple of things I never had an idea about. I learned to improve my LaTex skills and learned some presentation skills as well.