Implementation and Visualization of Discrete Stratified Morse Theory on Triangulated Domain

**meeting minutes**

Yulong Liang

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| Location: | Warnock Engineering Building (WEB) Room 4608 |
| Date: | January 23rd, 2018 |
| Time: | 11:00-12:00 am |
| Instructor: | Prof. Bei Wang Phillips |

# Project Description

This project is an implementation of Discrete Morse Theory to reduce noncritical data points while keeping the shape of the original data. **The first step** of the project is given a triangulated domain with Discrete Morse Function, producing and visualizing the gradient vector field (namely the noncritical simplex pairs and critical simplices) and perform simplicial removals on the noncritical simplices. **The second step** of the project is given a triangulated domain with any function, producing and visualizing the stratified gradient vector field (namely the violators as well as the noncritical simplex pairs and critical simplices within each stratum) and perform simplicial removals on the noncritical simplices for each stratum.

# Agenda items

1. Introduced the basic definition in Discrete Morse Theory, e.g., multidimensional simplex, face and co-face, and simplicial removal.
2. Discussed the properties and geometric realization of Discrete Morse Function and how Discrete Morse Theory can be implemented in topological data analysis.
3. Professor Wang introduced her research of Discrete Stratified Morse Theory which can be used on triangulations with any function value.
4. Decided the phases that can be visualized.

# To-do items

| **Action items** | **Deadline** | **Status** |
| --- | --- | --- |
| Get familiar with Object File Format (OFF) | 01/30/2018 | In Progress |
| Implement Discrete Morse Theory from scratch or find open source implementations from Internet | 01/30/2018 | In Progress |
| Read the paper on DSMT | 02/06/2018 | In Progress |