**Assignment Sheet -2**

**Assignments related to graph data representation and graph clustering**

**Note: All assignments are associated with a particular graph representation format. All the three basic tasks and advance task has to be implemented with that graph representation format.**

**For CSR, BSR, ELL refer to** http://docs.nvidia.com/cuda/cusparse/#introduction

**For K^2- Tree format refer to** http://www.sciencedirect.com/science/article/pii/S0306437913001051

**Graph data:** Consider SNAP graphs only; refer to https://snap.stanford.edu/data/

**Advanced task for all assignments:** Implement any Community Detection or Graph Clustering algorithm (published in 2016/2015) considering the graph representation associated with respective assignments.

**Assignment 1:**

Graph Representation: K^2 Tree format

Basic Task 1: Betweeness centrality of any two nodes

Basic Task 2: Find minimum spanning Tree

Basic Task 3: Global Cluster coefficient of the graph

**Assignment 2:**

Graph Representation: K^2 Tree format

Basic Task 1: Shortest path between any two nodes

Basic Task 2: Breadth-First-Search

Basic Task 3: Find maximal-clique of the graph with Born-Kerbosch algorithm

**Assignment 3:**

Graph Representation: Compressed Sparse Row (CSR) format

Basic Task 1: Betweeness centrality of any two node

Basic Task 2: Find minimum spanning Tree

Basic Task 3: Global Cluster coefficient of the graph

**Assignment 4:**

Graph Representation: Compressed Sparse Row (CSR) format

Basic Task 1: Shortest path between any two nodes

Basic Task 2: Breadth-First-Search

Basic Task 3: Find maximal-clique of the graph with Born-Kerbosch algorithm

**Assignment 5:**

Graph Representation: Ellpack-Itpack (ELL) format

Basic Task 1: Betweeness centrality of any two node

Basic Task 2: Find minimum spanning Tree

Basic Task 3: Global Cluster coefficient of the graph

**Assignment 6:**

Graph Representation: Ellpack-Itpack (ELL) format

Basic Task 1: Shortest path between any two nodes

Basic Task 2: Breadth-First-Search

Basic Task 3: Find maximal-clique of the graph with Born-Kerbosch algorithm

**Assignment 7:**

Graph Representation: Block Compressed Sparse Row (BSR) format

Basic Task 1: Betweeness centrality of any two node

Basic Task 2: Find minimum spanning Tree

Basic Task 3: Global Cluster coefficient of the graph

**Assignment 8:**

Graph Representation: Block Compressed Sparse Row (BSR) format

Basic Task 1: Shortest path between any two nodes

Basic Task 2: Breadth-First-Search

Basic Task 3: Find maximal-clique of the graph with Born-Kerbosch algorithm

**Assignment 9:**

Graph Representation: Coordinate (COO) format

Basic Task 1: Betweeness centrality of any two node

Basic Task 2: Find minimum spanning Tree

Basic Task 3: Global Cluster coefficient of the graph

**Assignment 10:**

Graph Representation: Coordinate (COO) format

Basic Task 1: Shortest path between any two nodes

Basic Task 2: Breadth-First-Search

Basic Task 3: Find maximal-clique of the graph with Born-Kerbosch algorithm

**Assignment 11:**

Graph Representation: Compressed Sparse Column (CSC) format

Basic Task 1: Betweeness centrality of any two node

Basic Task 2: Find minimum spanning Tree

Basic Task 3: Global Cluster coefficient of the graph

**Assignment 12:**

Graph Representation: Compressed Sparse Column (CSC) format

Basic Task 1: Shortest path between any two nodes

Basic Task 2: Breadth-First-Search

Basic Task 3: Find maximal-clique of the graph with Born-Kerbosch algorithm

Surveys:

1. Survey on Graph Clustering Applications

2. Survey on Active Community Detection

3. Survey on Dynamic Community Detection

4. Survey on Community Detection Techniques in Directed Graphs

5. Survey on Overlapping Community Detection