

Betweenness Centrality for Dynamic Graphs

Bachelor's Thesis / Master Project

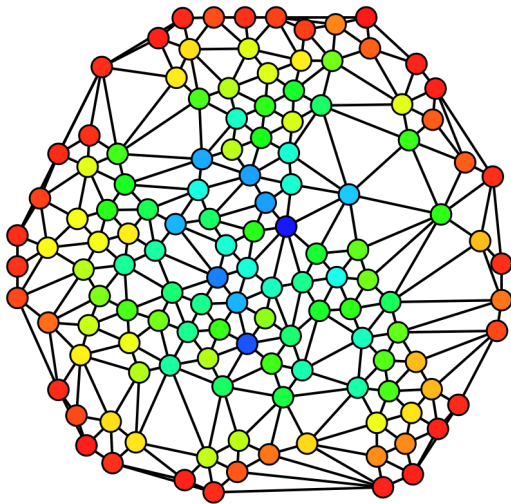


Figure 1: An undirected graph, coloured based on the **betweenness centrality** of each vertex from least (red) to greatest (blue).

Description:

We are currently developing a dynamic graph framework for GPUs, called *faimGraph*. As the pure representation of such a graph is only part of the appeal of graph processing, deriving interesting metrics from such a graph is typically the reason to manage a graph in the first place. The goal of this thesis is to implement *Betweenness Centrality* for CSR (Compressed Sparse Row) data structures as well as *faimGraph*. *Betweenness Centrality* is a measure of centrality in a graph based on shortest paths, it is given per vertex as the number of these shortest paths that pass through the vertex. Such implementations typically have a lot of optimization potential that can be exploited as much as is permitted by the time frame of the project. Optionally, one could exploit the dynamic setting to avoid re-computation after a graph update.

Objective:

- Implement basic version of *Betweenness Centrality* for CSR on the CPU
- Implement algorithm on the GPU for CSR and *faimGraph*
- (Optional) Exploit dynamic setting to avoid re-computation after a graph update

Qualifications:

- Experience in C++
- Experience CUDA, OpenCL or similar parallel computing framework
- Interest in massively-parallel compute architectures and graph processing

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