
Assignment 6

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Exercise 2

a) The ZAME visualization tool uses a specific hierarchical data structure for storing graphs at multiple scales. At the lowest level, four integers are stored per vertex, and either six or four per edge. What do these integers describe? Which two are optional in case of the edges, and what is their purpose?

Answer. The specific hierarchical structure is three-dimensional binary pyramid. The bottom most level of the pyramid is actually an adjacency matrix of the raw data and four nodes are stored per vertex. So, the integers represent the number of nodes per vertex/edge.

The doubly-linked edge lists and back-link are optional and can be skipped to consume memory consumption in need. The purpose for doubly-linked edge list is to provide optimisation for faster removal of edge.

c) In the pseudocode listed in the paper's Figure 4, some modifications are highlighted in boldface, on lines starting with a bar. What is the purpose of these modifications?

Answer. The purpose of these modifications is to eliminate the bias introduced by pivoted vertices. In the new version, High Dimension Embedding (HDE) penalizes the edges by using them in order to find the shortest path for all pivot pairs. Consequently, this helps algorithm to introduce new pivots in regions that were not traversed by previous pivots. By using these modifications, the algorithm will learn different as well as important features that it wasn't able to learn before. Although, it improves but still falls short to address the issue of the number of pivots required to represent a large graph.

d) What is the difference between geometric zoom and detail zoom in the system?

Answer. The geometric zoom is a continuous measure whereas detail zoom is a discrete measure. The geometric zoom answers the question - WHICH part of the matrix is mapped to the screen of the user whereas detail zoom answers the question - WHICH discrete level of the hierarchical pyramid matrix needs to be drawn?