

Topology Management in Peer-to-Peer Systems

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January 21, 2011

1 Problem Statement

Using an algorithm based on the paper [1] by Jelasity and Babaoglu, this assignment asked to simulate a distributed node system managing its topology. The algorithm involves having the nodes trading neighbor lists and selecting the closest. The result is that after a certain amount of cycles, the topology begins to converge to the optimal.

2 Approach

Following the notes in the assignment, the algorithm was created in Python 2.7.1. The nodes were instantiated as objects that had a gossip method in which the node would trade neighbor lists with one of its neighbors. The node would then select the k closest nodes, where k is an input parameter. The node class had other methods for finding the distance to a given node and choosing the closest neighbors. Another class was made to help set up a system and simulate it. More information can be found in the source code `hw1.py`.

3 Results and Figures

The code was written with unit tests to ensure every step of development was correct and development proceeded without major issues. Figure 1 shows the plot requested for this assignment.

References

- [1] Mrk Jelasity and Ozalp Babaoglu. T-man: Gossip-based overlay topology management. In Sven Brueckner, Giovanna Serugendo, David Hales, and Franco Zambonelli, editors, *Engineering Self-Organising Systems*, volume 3910 of *Lecture Notes in Computer Science*, pages 1–15. Springer Berlin / Heidelberg, 2006.

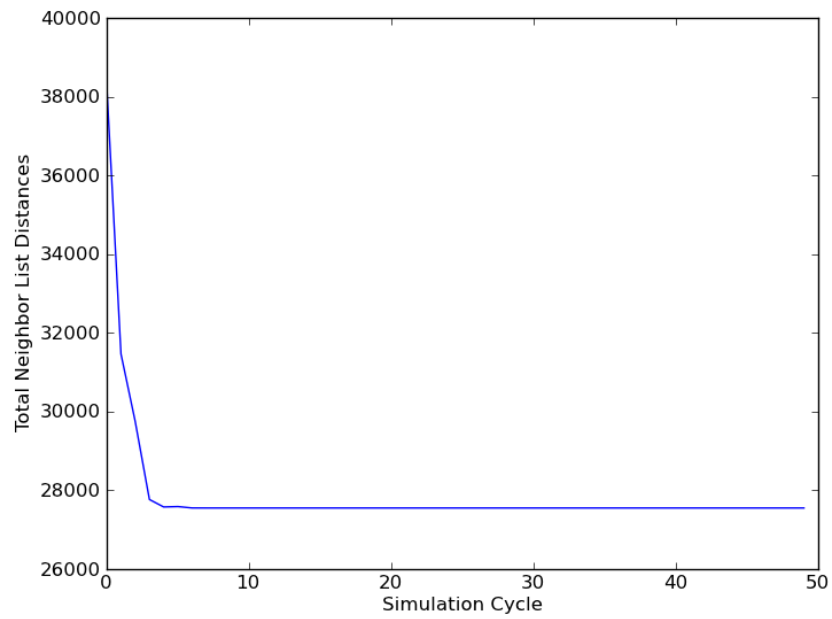


Figure 1: Total Distances in Neighbors over 50 simulation cycles with system size of 1024 nodes and neighbor list length of 3.