



InterSatellite Communication: Parallel Propagation

HPPL Final Project by:

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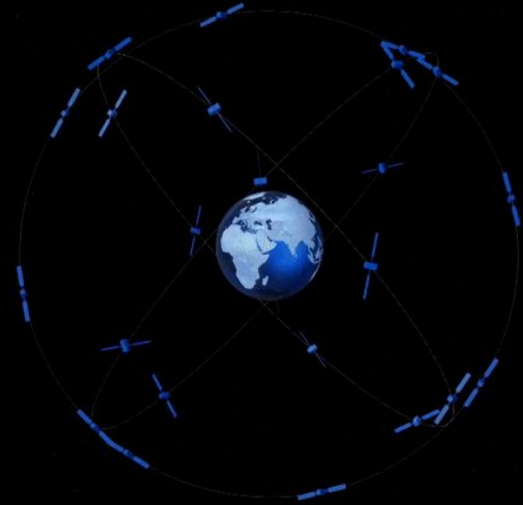
Problem definition

- Big constellations
- High satellite speeds
- Propagation module takes time

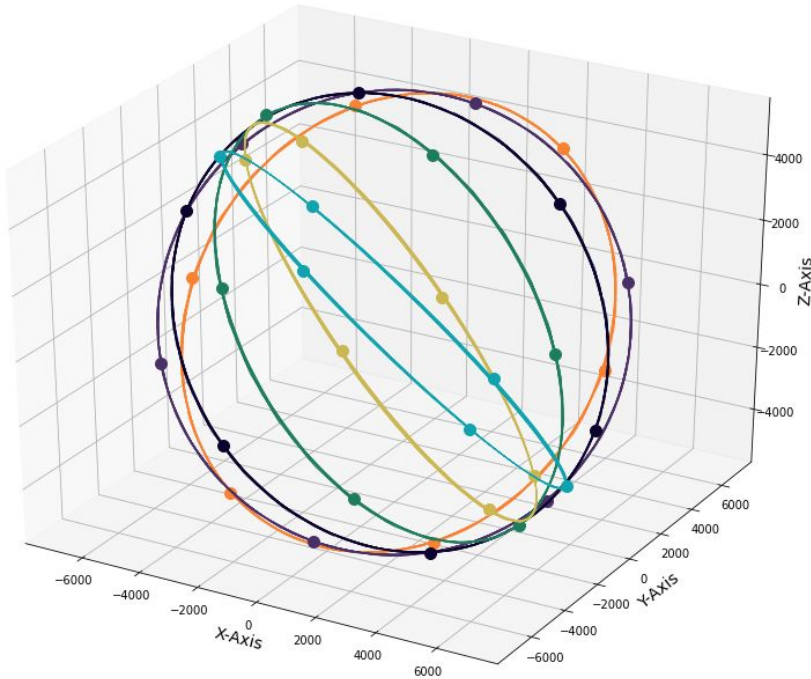
1st - Create constellation (Walker)

2nd- Design inter satellite communication link

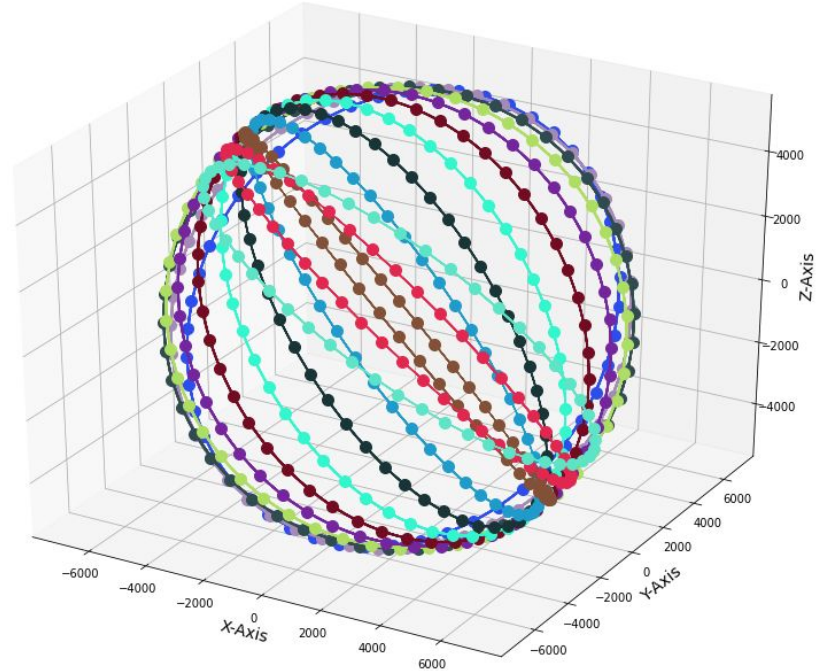
3rd- propagate these satellites



Walker constellations



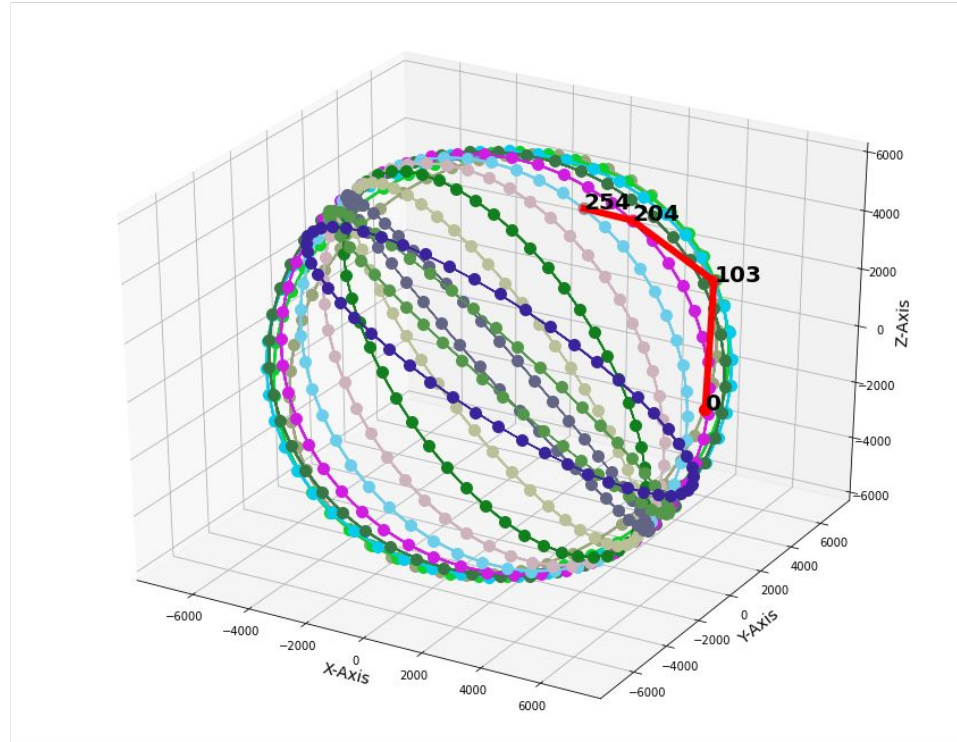
Walker: T(36), P(6), F(1)



Walker: T(600), P(12), F(1)

Intersatellite communications

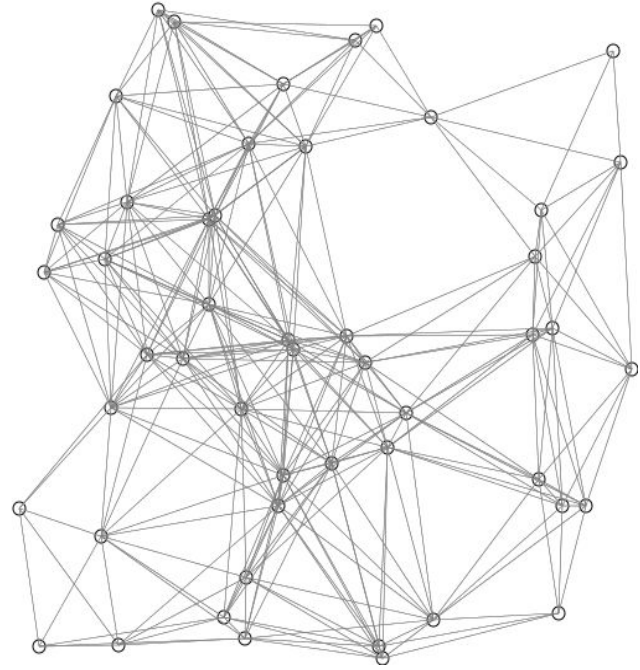
We found the following best path
with a value of 11375.
0 -> 103 -> 204 -> 254



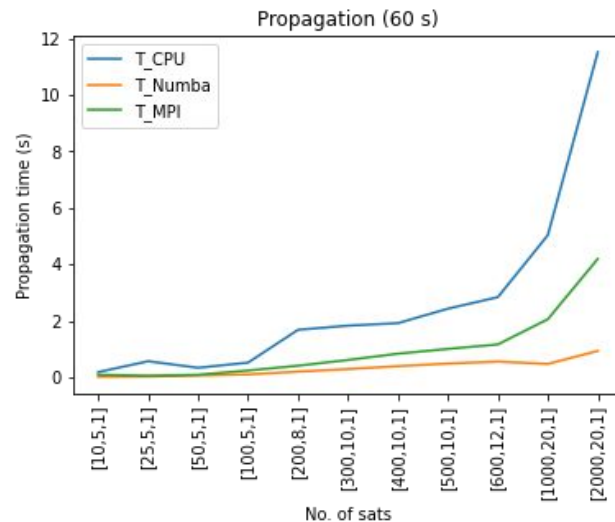
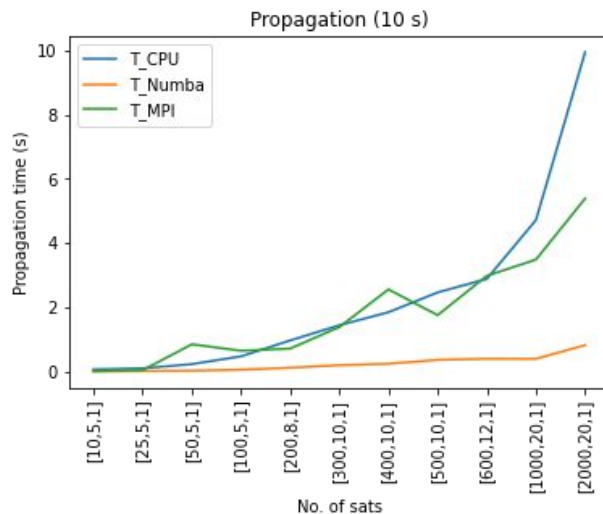
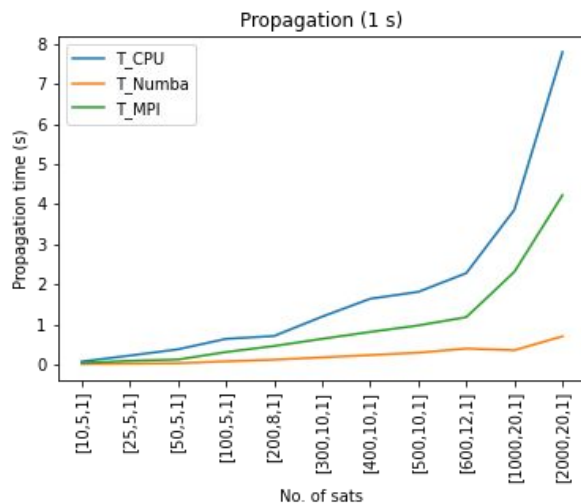
Walker: T(600), P(12), F(1)

Dijkstra's Algorithm

- ❖ **Dijkstra's algorithm** is an algorithm for finding the shortest paths between nodes in a graph.
- ❖ **How does it work?:**
The algorithm uses the weights of the edges to find the path that minimizes the total distance (weight) between the source node and all other nodes.
- ❖ **Applications :** GPS navigation, Networking...



Propagation time (Numba \ mpi4py(2 cores) for parallelization)



Speedup (Numba \ mpi4py(2 cores) for parallelization)

