Notes for Autonomous Robotic Networks

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1 Centralized Algorithms

From 1.4.4 and 2.4.4 of Bullo. Given a digraph G we say that the length of a directed path is the number of edges in a path. Given verticies u and v in G the distance from u to v is the length of the shortest path between them. This is sometimes written as

$$\text{dist}_G(u, v) = \min(\{\text{length}(p) | p \text{ is a directed path from } v \text{ to } u)$$

Given a vertex v in G the radius of v in G is the max of all distances from v to all other nodes in G.

$$\text{radius}(v, G) = \max\{\text{dist}_G(v, u) | u \in V(G)\}$$

Let v be a vertex of G with radius of v in G less than positive infinity. Then G is connected, since there is a path between all all vertexs G. A Breadth first spanning tree (BFS) is a spanning tree made using BFS.

For a digragph G with respect to vertex v, then the tree T prduced by performing BFS starting from v contains the shortest path from v to all other reachable verteces. If G contains a spanning tree rooted at v, then T is also a spanning tree.

We now turn to DFS. DFS or Depth First Search uses a stack, rather than a queue. If T is a from a DFS on graph G starting from vertex v.

We now turn to Dijkstra's Algorithm.

By the end of the week (tomorrow) send in your choice of 3 papers to professor Issacs.