Asynchronous deterministic rendezvous in graphs (Ugo Vaccaro - Università di Salerno)

Two mobile agents (robots) having distinct labels and located in nodes of an unknown anonymous connected graph, have to meet. We consider the asynchronous version of this well-studied rendezvous problem and we seek fast deterministic algorithms for it.

Since in the asynchronous setting meeting at a node, which is normally required in rendezvous, is in general impossible, we relax the demand by allowing meeting of the agents inside an edge as well.

The measure of performance of a rendezvous algorithm is its {\em cost}: for a given initial location of agents in a graph, this is the number of edge traversals of both agents until rendezvous is achieved. If agents are initially situated at a distance D in an infinite line, we show a rendezvous algorithm with cost $O(D|L_{min}|^2)$ when D is known and $O((D+|L_{max}|)^3)$ if D is unknown, where $|L_{min}|$ and $|L_{max}|$ are the lengths of the shorter and longer label of the agents, respectively.

These results still hold for the case of the ring of unknown size but then we also give an optimal algorithm of cost $O(n|L_{min}|)$, if the size n of the ring is known, and of cost $O(n|L_{max}|)$, if it is unknown. For arbitrary graphs, we show that rendezvous is feasible if an upper bound on the size of the graph is known and we give an optimal algorithm of cost $O(D|L_{min}|)$ if the topology of the graph and the initial positions are known to agents.