Infinite Update Networks on Finite Graphs using Grossone

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Communication networks can be modeled and their problems analyzed using the concept of infinite games on finite graphs. For example, in a distributed database system a problem of redundancy of data can be resolved by sharing information between all nodes of the system. This can be accomplished by a packet of current data continuously running through all nodes of the distributed system. Hence this is a solution without termination (an infinite update) and was originally shown by McNaughton (see [3] and [4]). In [1], the theory of grossone (see [2] and [5]) and the infinite unit axiom have been applied to develop a finer and more precise theory of infinite games on finite graphs. In this paper, the work on infinite games is extended to update networks, whereby each network node is updated infinitely often. By using grossone, the number of visitations to each node can be counted with precision so that each node is visited the same number of times and hence creates a"balanced" update network. Here update networks are studied, by using graph theory arguments, and a decision process is built to determine when it is possible to create a balanced network with infinite node visitations.

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