Asimptotic stability in the network with feedback and conflict resolution

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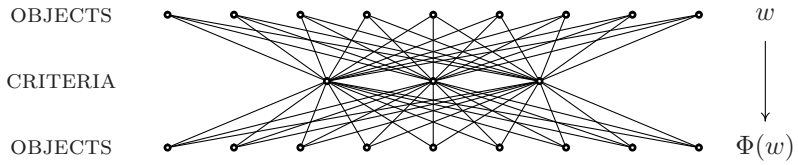
Networks with feedback in conflict resolution context are the generalization of the hierarchical structure in goal oriented thinking. The concept of self-duality explains the situation when the elements of decision are criteria and the options at the same time. A typical example is a group of decision makers who attempt to rank themselves (self ranking).

In this paper we suppose that decision maker exhausted all possibilities to add some other option into consideration, i.e. that he ***does not change the structure*** of the hierarchy and ***does not change the preferences*** of the objects inside the hierarchy. The ***source of the conflict*** is the ***unknown importance*** of his goals.

In a self ranking system the change of initial ranks w directly influences the weights of actions, and indirectly changes the weights $\Phi(w)$ of the goals because of the feedback. Repeating the process

$$w \mapsto \Phi(w) \mapsto \Phi(\Phi(w)) \mapsto \cdots \mapsto \Phi^n(w) \mapsto \cdots$$

the infinite sequence of weights is obtained. It can be proved that this sequence has a unique fixed point λ, i.e. $\lambda = \Phi(\lambda)$, which is independent of the first choice of w. An application of this approach is the conflict resolution which arise when



two robots are passing through the corridor. To avoid the crash they can:

turn right (R), turn left (L), wait (no action) (W).

Logical structure of the robot is defined by the preferences among the robots reactions. For instance, if the first robot is waiting (W), the second robot prefers moving (R) or (L) when compared with (W), and moving (R) is preferred to (L) and so on. In the first level of the hierarchy are the options of the first robot, in the second level are the options of the second robot and each element in one level is the criterion for the elements in the other level. The reader can perform the ranking procedure on the page http://decision.math.hr/examples/robotscoridor.php/

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