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Boosting cultural algorithms with a heterogeneous layered social fabric influence function

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Abstract: In this paper we investigate the emergence and power of a complex social system based upon principles of cultural evolution. Cultural Algorithms employ a basic set of knowledge sources, each related to knowledge observed in various social species. Here we extend the influence and integration function in Cultural Algorithms by adding a mechanism by which knowledge sources can spread their influence throughout a population in the presence of a heterogeneous layered social network. The interaction (overlapping) of the knowledge sources, represented as bounding boxes on the landscape, at the right level projects how efficient the cooperation is between the agents in the resultant ?Social Network?. The inter-related structures that emerge with this approach are critical to the effective functioning of the approach. We view these structures as constituting a ?normal form? for Cultures within these real-valued optimization landscapes. Our goal will be to identify the minimum social structure needed to solve problems of certain complexities. If this can be accomplished, it means that there will be a correspondence between the social structure and the problem environment in which it emerged. An escalating sequence of complex benchmark problems to our system will be presented. We conclude by suggesting the emergent features are what give cultural systems their power to learn and adapt.