

## **Motivating Social Community Detection with Cultural Algorithms**

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Knowledge plays an important role in search, classification and machine learning. Classical cultural algorithms (CA) provided an interesting population based evolutionary computation method that harnesses the knowledge of a population in an evolving global belief space. While CA have demonstrated success in solving optimization problems and applied in multi-agent based systems, much of the recent work has been in extending them to address more complex problems. One outcome is the expansion of the population space to multiple populations, and in some cases multiple belief spaces. A recent application motivated by the Multi-Population Cultural Algorithm (MPCA) and its variants has been to address social networks where communication and exchange of knowledge play an important role in guiding and reshaping the underlying population beliefs and behaviour. Community detection is a fundamental problem in social network analysis that has been widely explored, but given the growing size and complexity of the social networks, it remains an ongoing challenge.

Our recent work explored knowledge-based evolutionary algorithms to address this problem by using a customized MPCA. The algorithm extracts knowledge from the network to guide the search direction in search of an optimal solution. As the network state changes, the knowledge is continuously updated. This approach is evaluated against comparable algorithms and examined for its ability to detect communities in terms of its speed and accuracy.