PSO for component detection

Dong et al. (2012) use PSO for component detection.

Questions

1. Explain the problem of component detection. Why is optimization needed? What methods have been used in the literature for component detection? Describe briefly at least two and comment on the results that have been obtained using them.

2. Describe the multiple-species PSO and implement the method. Compare the results obtained for a synthetic example to those obtained by another method. Would chaotization improve the results? Motivate.

References

Dong, N., Wu, C.-H., Ip, W.-H., Chen, Z.-Q., and Yung, K.-L. (2012). Chaotic species based particle swarm optimization algorithms and its application in PCB components detection. *Expert Systems with Applications*, 39:12501–12511.