

Supplemental Material 3

The agent-based brain-inspired model was tested on the density classification problem for a range of densities using the thresholded, weighted network. At each density, a proportion of nodes are selected to be on, where this proportion corresponds to the desired density. The ideal rule and set of parameters will allow the ABBM to solve the density-classification at any density. The rule and parameters used here enables the ABBM to solve the density-classification problem for most, but not all, densities. When the thresholded weighted network is created, weak links are removed from the original network, and stronger links retain their weighted values. Removing weak links from the network results in groups of nodes that are well interconnected among themselves and less interconnected with the rest of the network, a property known as community structure. For densities where the ABBM could not solve the problem correctly, typically it is the same nodes that do not agree with the rest of the network. Information is shared within a community, and community nodes likely tend to synchronize states with each other more readily than with other network nodes. Therefore one community that is only weakly connected to the rest of the network may not be consistent with the remainder of the network.



