Automating the Superparamagnetic Clustering Method

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Superparamagnetic clustering is a method for clustering data that exploits the phase transitions in grannular ferromagnets for solving the clustering problem. Each data point is associated with a spin; the mapping from the clustering problem to a ferromagnet is dependent on the value of a parameter 'K', which controls the number of neighbors with which each spin interacts. The value of K determines the kind of highly inhomogeneous lattice to which the data are transformed, and the solution of the clustering process exhibits non-trivial dependence on this parameter. Untill recently K was determined by exploring a wide interval of possible values, which is a computationally expensive procedure. We present a method for determining the range of this parameter for which best clustering solutions are obtained. The method is fully automated and gives the optimal range of 'K' almost instantaneously.