TRAINING RESTRICTED BOLTZMANN MACHINES DESPITE PHASE TRANSITIONS

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ABSTRACT

Restricted Boltzmann Machine (RBM) is an old, simple but fundamental Energy based model still widely used to analyze and generate structured data of medium size. RBM are notoriously difficult to train and require advanced sampling techniques to obtain the actual equilibrium distribution of the data. In this talk we discuss the distinction to be made between equilibrium vs non-equilibrium models and the various hurdles to overcome in order to obtain interpretable equilibrium model of high quality. These hurdles are related to the presence of 1st and second order phase transition present all along the learning process that can be analyzed in details. Based on this analysis an innovative approach based on a low rank initialization and a parallel tempering procedure along the learning trajectory is presented that addressed efficiently the problem in difficult cases of interest.