Abstract - We present a new curvilinear algorithmic model for training neural networks which is based on a modifications of the memoryless BFGS method that incorporates a curvilinear linesearch. The proposed model exploits the nonconvexity of the error surface based on information provided by the eigensystem of memoryless BFGS matrices using a pair of directions; a memoryless quasi-Newton direction and a direction of negative curvature. In addition, the computation of the negative curvature direction is accomplished avoiding any storage andĀ matrix factorization. Simulations results verify that he proposed modification significantly improves the efficiency of the training process.