

# Stability Results for Neural Networks

**Authors:**

Anthony Michel, Jay Farrell, Wolfgang Porod

**Abstract:**

In the present paper we survey and utilize results from the qualitative theory of large scale interconnected dynamical systems in

order to develop a qualitative theory for the Hopfield model of neural networks. In our approach we view such networks as an inter(cid:173) connection of many single neurons. Our results are phrased in terms of the qualitative properties of the

individual neurons and in terms of the properties of the interconnecting structure of the neural networks. Aspects of neural networks

which we address include asymptotic stability, exponential stability, and instability of an equilibrium; estimates of trajectory bounds; estimates of the

domain of attraction of an asymptotically stable equilibrium; and stability of neural networks under structural perturbations.