CTRNN Extended Abstract

This extended abstract presents the results of experiments into the dynamics of a continuous time recurrent neural network (CTRNN). CTRNNs can simulate complex systems of dynamic variables; they comprise a network of nodes, each connected to the others, and the change in their outputs over time is modelled here by a (simplified) differential equation:

This equation is a simplified version of the standard CTRNN, which usually contains a bias term . Also, this version uses a hyperbolic tangent sigmoid transfer function (a function which clamps the values between 0 and 1), but it could equally use some other sigmoid function. In our task, initially the weights are chosen randomly from a normal distribution with zero mean and variance σ, the inputs are initially set to 0, and the connectivity of the network is governed by setting weights to 0 with probability *Pc*. The system is then simulated using Euler’s forward integration method with time step 0.01.

TODO get some kind of results of interest

Table of pc x vnc (rows x columns)

VNC

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

0.1 50 1 0 0 0 0 0 0

0.2 50 0 0 0 0 0 0 0

0.3 50 4 0 0 0 0 0 0

pnc 0.4 50 7 0 0 0 0 0 0

0.5 50 22 0 0 0 0 0 0

0.6 50 39 0 0 0 0 0 0

0.7 50 50 7 0 0 0 0 0

0.8 50 50 36 0 0 0 0 0

0.9 50 50 50 39 17 1 0 0