

COMP9444 Neural Networks and Deep Learning

Term 3, 2020

Exercises 8: Hopfield Networks

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1.
 - a. Compute the weight matrix for a Hopfield network with the two memory vectors $[1, -1, 1, -1, 1, 1]$ and $[1, 1, 1, -1, -1, -1]$ stored in it.
 - b. Confirm that both these vectors are stable states of this network.
 2. Consider the following weight matrix W :
$$\begin{array}{ccccc} 0.0 & -0.2 & 0.2 & -0.2 & -0.2 \\ -0.2 & 0.0 & -0.2 & 0.2 & 0.2 \\ 0.2 & -0.2 & 0.0 & -0.2 & -0.2 \\ -0.2 & 0.2 & -0.2 & 0.0 & 0.2 \\ -0.2 & 0.2 & -0.2 & 0.2 & 0.0 \end{array}$$
 - a. Starting in the state $[1, 1, 1, 1, -1]$, compute the state flow to the stable state using asynchronous updates.
 - b. Starting in the (same) state $[1, 1, 1, 1, -1]$, compute the next state using synchronous updates.
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Make sure you attempt the questions yourself, before looking at the [Sample Solutions](#).