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:

$$\begin{bmatrix} 0.0 & -0.2 & 0.2 & -0.2 & -0.2 \\ -0.2 & 0.0 & -0.2 & 0.2 & 0.2 \\ 0.2 & -0.2 & 0.0 & -0.2 & -0.2 \\ -0.2 & 0.2 & -0.2 & 0.0 & 0.2 \\ -0.2 & 0.2 & -0.2 & 0.2 & 0.0 \end{bmatrix}$$

   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.

Make sure you attempt the questions yourself, before looking at the Sample Solutions.