

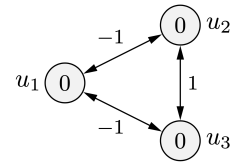
Exercise Sheet 12

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EX46

Determine the energy function of the Hopfield network of Exercise 45! With the help of this energy function, compute the energies of the individual states of the network. Then arrange the states according to their energy, that is, draw a new state transition graph, in which the location of the states indicates their energy!



The energy function of a Hopfield network:

$$E = -\frac{1}{2} \vec{act}^\top \mathbf{W} \vec{act} + \underbrace{\vec{\theta}^\top \vec{act}}_0 \quad (\text{from lesson})$$

Solution

$$\mathbf{W} = \begin{pmatrix} 0 & -1 & -1 \\ -1 & 0 & 1 \\ -1 & 1 & 0 \end{pmatrix}$$

$$\begin{aligned} \vec{act} = (-1, -1, -1)^\top &\Rightarrow E(- - -) = 1; \\ \vec{act} = (+1, -1, -1)^\top &\Rightarrow E(+ - -) = -3; \end{aligned}$$

