Computational Neuroscience and Neurotheory: Homework 5

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June 30, 2025

1 Question 1

For $P = 1, q(0) > 0$, the network reaches the memory pattern after 1 timestep iteration of the Hopfield network (Figure 1). As P increases, the effect of $q(0)$ can be seen. For $P = 5$, $q(0) < 0.2$ does not cause the network to have the pattern of the first memory, and for $0.2 < q(0) < 0.5$, the network requires multiple time steps to have the same pattern as the first memory (Figure 1). For $P = 10, q(0) < 0.5$, the network does not converge to the first memory pattern and does so only when $q(0) >= 0.7$ (Figure 1).

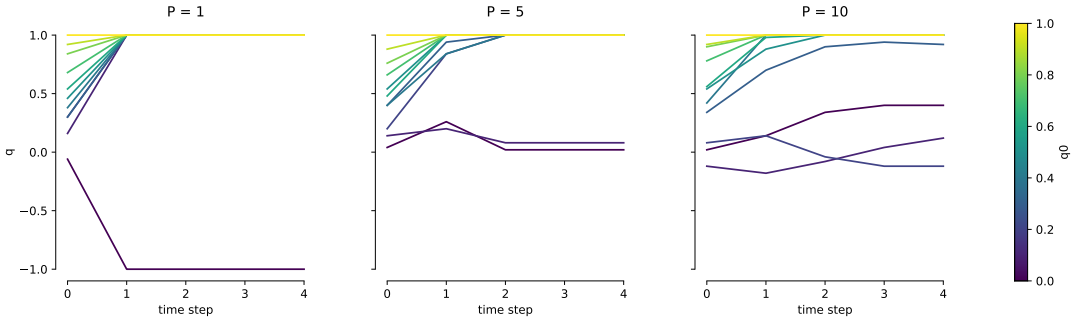

Figure 1

2 Question 2

For all simulations, $q(0) = 1$, and as P increases above 20, the network diverges away from the first memory pattern, after 1 time step (Figure 2). This suggests that the network is representing more patterns than it can store.

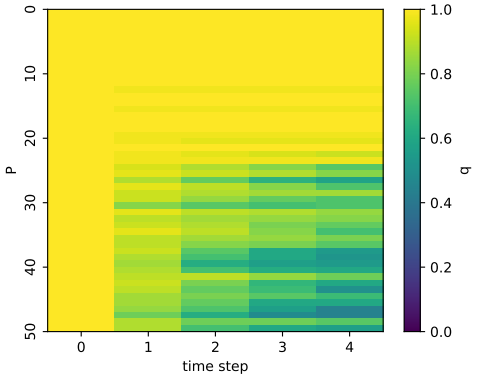

Figure 2