

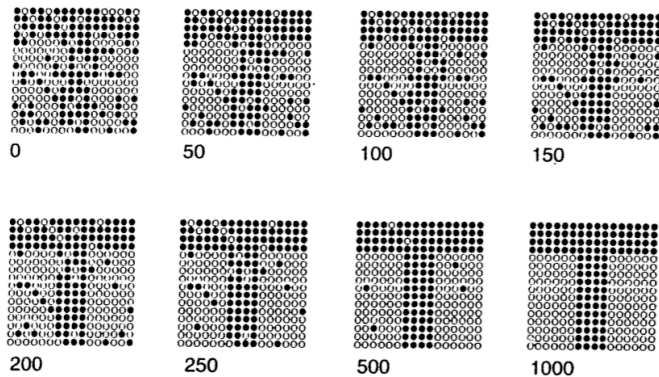
# Hopfield Networks

Michael Wollowski

Images are from a source since lost to me.

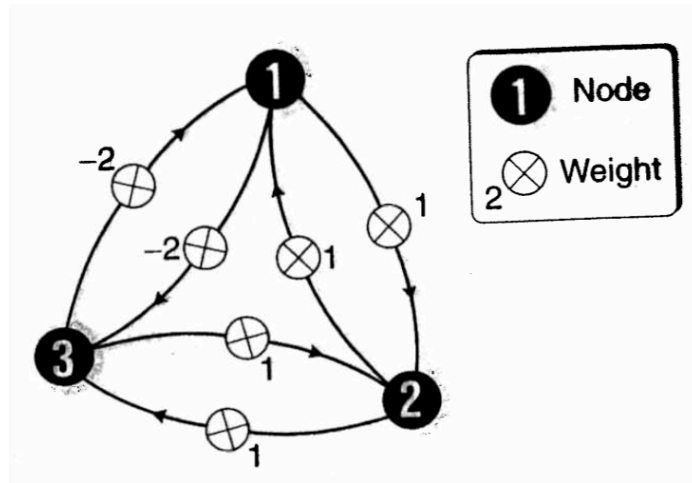
## Recurrent Networks

- Hopfield networks have symmetric weights
- They can be thought of as holographic associative memory
- Example:



## Sample Three-node Hopfield Network

- Activation:  $\geq 0$



## Transition Table

Components $x_1$ $x_2$ $x_3$	State label	Calculate node 1 output	Calculate node 2 output	Calculate node 3 output
0 0 0	0	1 0 0 (4)	0 1 0 (2)	0 0 1 (1)
0 0 1	1	0 0 1 (1)	0 1 1 (3)	0 0 1 (1)
0 1 0	2	1 1 0 (6)	0 1 0 (2)	0 1 1 (3)
0 1 1	3	0 1 1 (3)	0 1 1 (3)	0 1 1 (3)
1 0 0	4	1 0 0 (4)	1 1 0 (6)	1 0 0 (4)
1 0 1	5	0 0 1 (1)	1 1 1 (7)	1 0 0 (4)
1 1 0	6	1 1 0 (6)	1 1 0 (6)	1 1 0 (6)
1 1 1	7	0 1 1 (3)	1 1 1 (7)	1 1 0 (6)

# Transition State Diagram

