

Hopfield Networks

- Another type of constraint satisfaction network
- Studied by John Hopfield in the early 1980s
- Network acts as a content-addressable memory
- Example:
 - 7 grayscale images, 130×180 pixels each
 - 23,400 nodes in the network
 - each node corresponds to an individual pixel
 - node activation corresponds to pixel color
 - connection strengths are fixed
 - pattern of node activations represents current image

Example: Stored Images

- Each stored image acts as an “attractor” in the space of activation patterns
- The network's activation pattern tends to evolve toward the closest stored image over time



Example: Retrieval With a Noisy Probe



Example: Retrieval With a Noisy Probe



Example: Retrieval With a Noisy Probe



Example: Retrieval With a Partial Probe



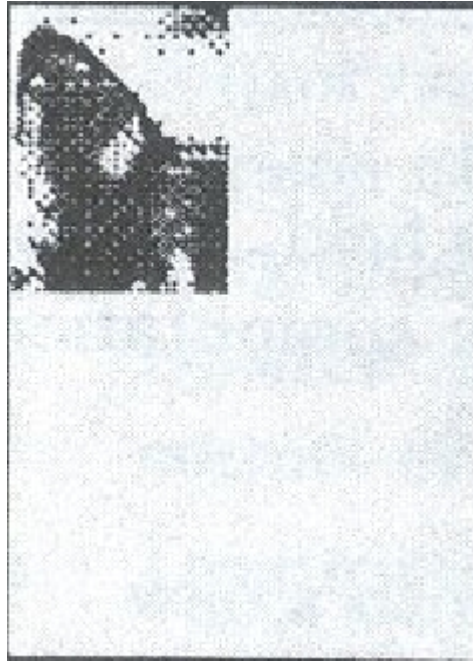
Example: Retrieval With a Partial Probe



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Example: Pattern Completion



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