

**Hopfield Nets**

Assume Steady State for analysis discrete steps from

can be any fn (, for instance)

is a stable state. Patterns are stable states.

For patterns :

Where

Noisy patterns require more signal than noise for the pattern to be recovered consistently.

**Supervised Learning** (differentiable )

Patterns:

Desired outputs:

Where

Gradient Descent

**Hebbian (unsupervised) Learning**

Weights can unboundedly grow… so Oja’s Rule is req’d:

**Perceptron**

Where is input, and is weight, and is a learned constant

3-layer perceptron can solve any continuous mapping function

4-layer perceptron can solve any mapping

From circuit model shown at left, we require that:

1. Assume that V is the output (no spikes)

2. is linear,

3. , where is a squashing fn, i.e.

Solid Inhibitory

Empty Excitatory