2000 Paper 7 Question 6

Neural Computing

Explain the key ideas of a Hopfield artificial neural network for content-addressable, associative memory. In explaining how memories are stored and retrieved, be sure to define the notions of:

- configuration space

- connectivity matrix

- stable attractor

- basin of attraction

- network capacity, and its dependence on the number of "neurones"

[10 marks]

Marshall as many lines of evidence as you can to support the view that in human vision "what you see is your own 'graphics', rather than the retinal image as faithfully recorded by photoreceptors in the eye". Explain the significance of this observation for vision theory and for machine vision. [8 marks]

Suppose you were trying to design a machine vision system based as closely as possible upon human vision. Would you aim to design in the visual illusions that nearly all people "see" as well? (These include the distortions of geometrical form, angle and relative length illusions, etc.) If such properties emerged as unintended consequences of your vision design, would you consider them to be features, or bugs? [2 marks]