COMP596 – Brain-inspired AI
Midterm test practice questions

Instructions

The actual test will consist of four questions like these ones. Answer all questions with 1-2 paragraphs in your own words (unless you are asked for math). Use proper sentences. Written answers will not be marked for spelling and grammar, *per se*. But, they will be marked based, in part, on the clarity and succinctness of the writing.

Question 1

What is "Lady Lovelace's" objection to the Turing Test and Turing's counter-argument to it?

Question 2

Define **graceful degradation**. What does it imply for our ability to cope with injury?

Question 3

Why is **spontaneous generalization** is easy when using distributed representations? Give an example to make the point concrete.

Question 4

Using the weight update for the Boltzmann machine (given below), prove that if the wake and dream distributions are equal then learning will have converged. Also, give a one sentence explanation for what the network has achieved when it converges.

Variables

W_{ij}: weight from neuron j to neuron i
a_j: activation of neuron j
T: temperature
ΔW_{ij}: the change in the weight
$\langle . \rangle^{wake}$: the expected value with respect to the wake distribution
$\langle . \rangle^{dream}$: the expected value with respect to the dream distribution

Weight update:

$$\Delta W_{ij} = \frac{1}{T}[\langle a_i a_j \rangle^{wake} - \langle a_i a_j \rangle^{dream}]$$