Lecture 14.3 Exercises

Project

a) Using the input and output representations and the training set supplied (training_set_initialise.m), develop an implementation of Botvinick and Plaut's SRN model of routine behavior. The model should consist of 37 input units, 50 hidden units and 19 output units, with weighted connections between input and hidden, hidden and hidden, and hidden and output units. Given a feature vector at input, the model should propagate activation through the network to produce an output.

b) Implement the BPTT training algorithm and train the model using the training set provided. Calculate RMS error for the training set and produce a graph of RMS error as a function of training epoch. Demonstrate that, once trained, the network can successfully perform all six sequential behaviors from the training set.

c) Produce 2 dimensional MDS plots of the network's behavior when adding sugar in the three different contexts of tea making, coffee making when cream has not been added, and coffee making when cream has been added. Do the plots suggest that the network has an implicit representation of the "add sugar" schema?

d) Explore the network's behavior following simulated neural damage. To simulate such damage, add randomly distributed noise (with small standard deviation) to the hidden units on each processing cycle.

[Note: This project can be done either by programming the SRN from first principles or by using the Matlab Neural Network toolbox.]