Foundations of Artificial Intelligence

Prof. Dr. J. Boedecker, Prof. Dr. W. Burgard, Prof. Dr. F. Hutter, Prof. Dr. B. Nebel, Dr. rer. nat. M. Tangermann
T. Schulte, M. Krawez, R. Rajan, S. Adriaensen, K. Sirohi
Summer Term 2020

University of Freiburg
Department of Computer Science

Exercise Sheet 11

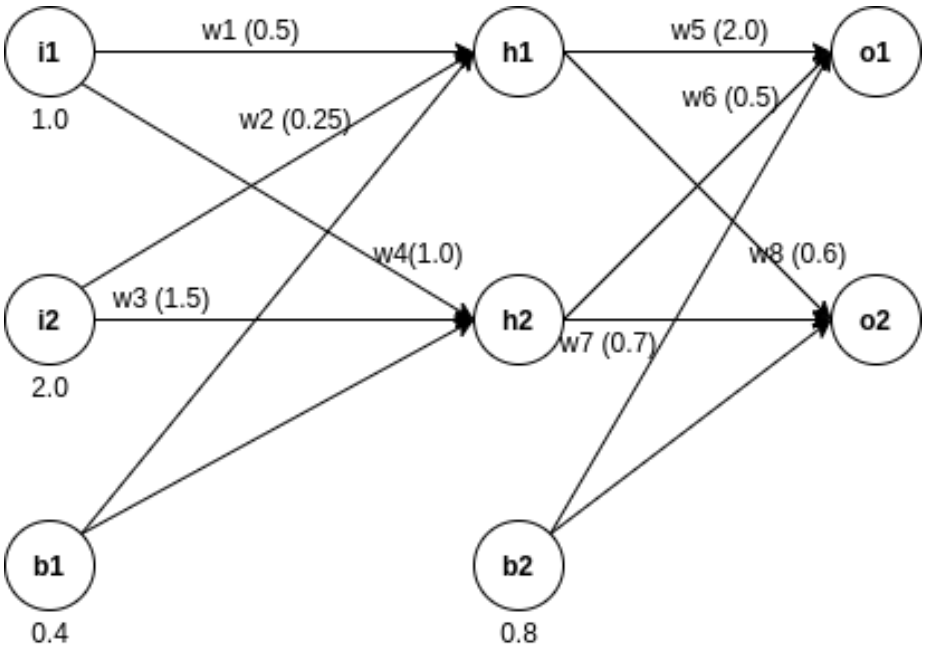
Due: Monday, July 27, 2020

Exercise 11.1 (Multi Layer Perceptron)

Given below is a structure of a multilayer perceptron with two inputs (i1 and i2), one hidden layer (h1 and h2), biases (b1 and b2) and one output layer (o1 and o2). The nodes in the hidden and output layer are activated using the logistic sigmoid activation function.

a) Perform one forward pass with the values of parameters depicted with every variable in the network and calculate the outputs(o1, o2).

b) Calculate the mean square error given the values of outputs (o1, o2) as (2.0, 4.0).



Exercise 11.2 (Convolutional Neural Network)

Given below is a sequence of operations in a small convolutional neural network (CNN) which takes input of shape (48 x 48 x 3). Calculate the output size and

number of trainable paramters after each layer of the network.
conv1 and conv2 are the convolutional layers with given filter size f ,stride s and output feature size o.

layer	**shape**	**parameters**
Input	(48,48,3)	0
conv1(f=3,s=1,o=8)		
conv2(f=5,s=1,o=16)		

Note: The exercise sheets may be worked on in groups of up to three students.