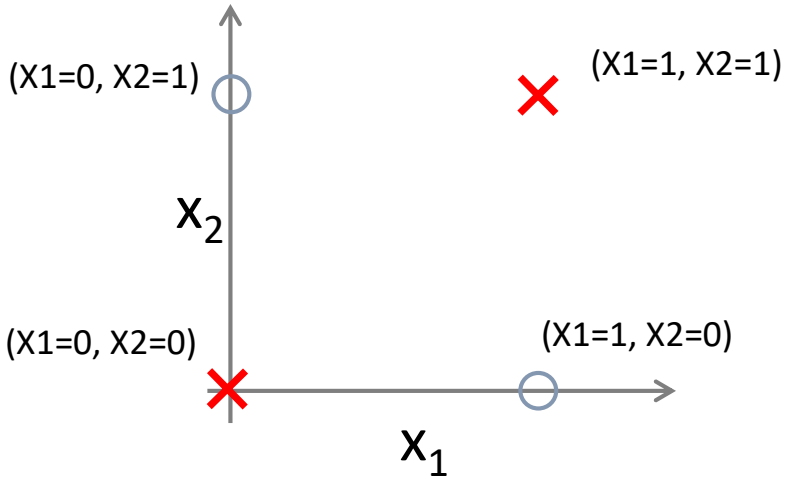
Artificial Neural Networks

Lab Activity

Overview

- XOR problem
  - Reference: From Prof. Andrew ng slides
- Classification using neuralnet R package
- Classification and regression toy problems using nnet R package
- Multi-class Classification problem using nnet

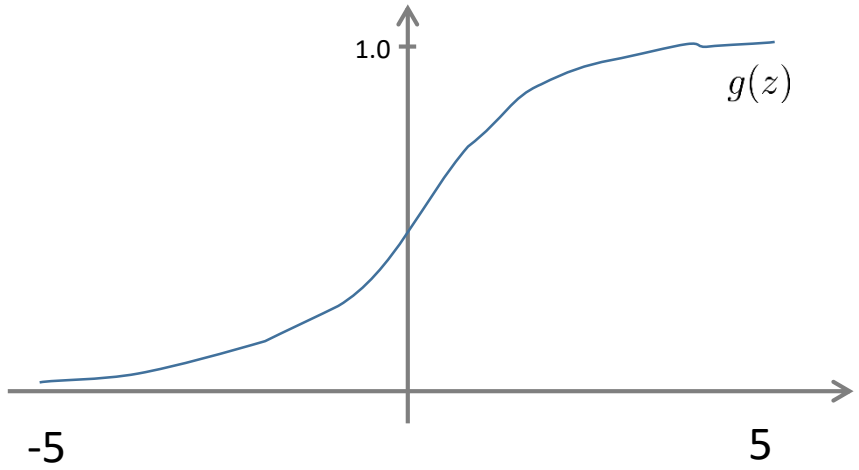
XOR classification example

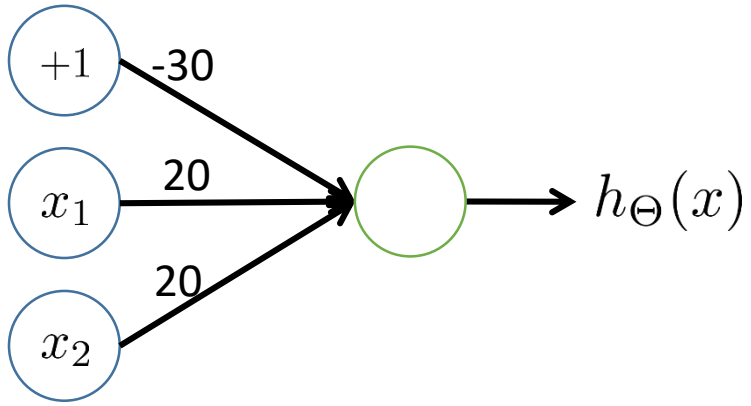


AND

$x_1, x_2 \in \{0, 1\}$

$y = x_1 \text{ AND } x_2$

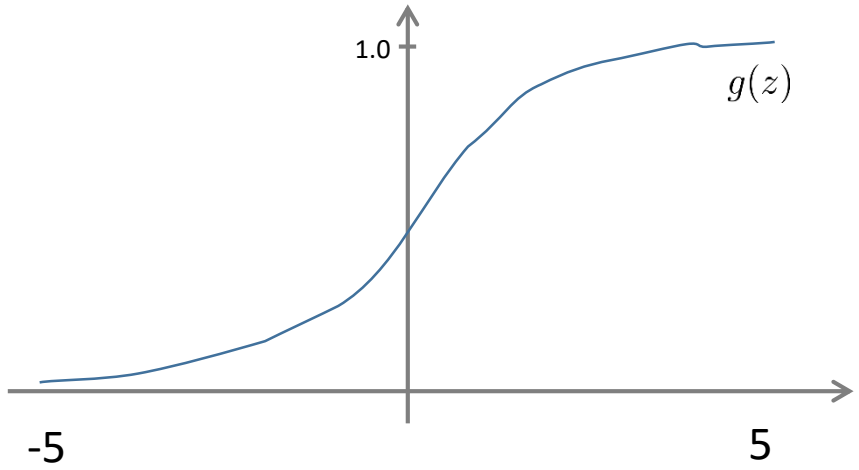


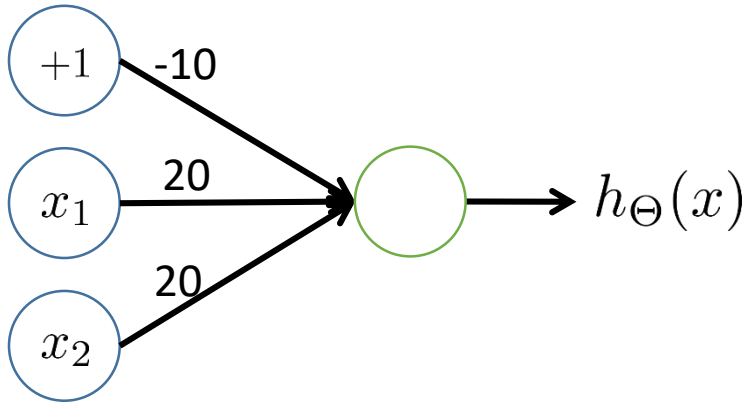


x_1	x_2	$h_\Theta(x)$
0	0	
0	1	
1	0	
1	1	

OR

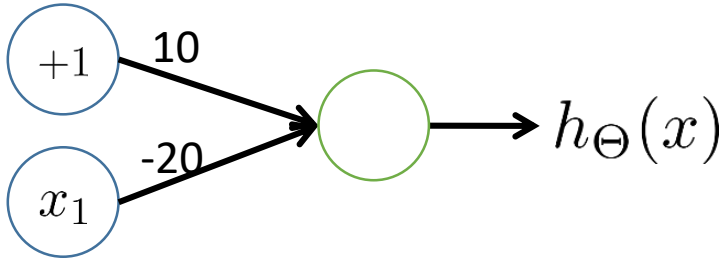
$x_1, x_2 \in \{0, 1\}$
$y = x_1$ OR x_2





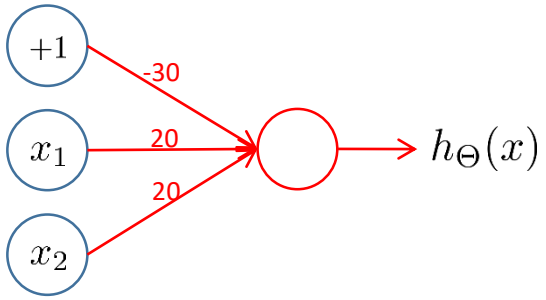
x_1	x_2	$h_\Theta(x)$
0	0	
0	1	
1	0	
1	1	

Negation

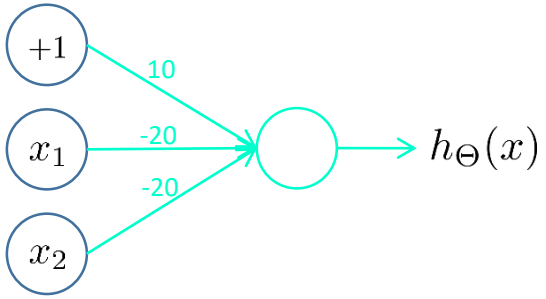


x_1	$h_\Theta(x)$
0	
1	

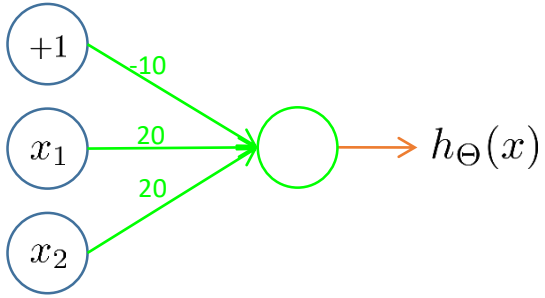
XNOR



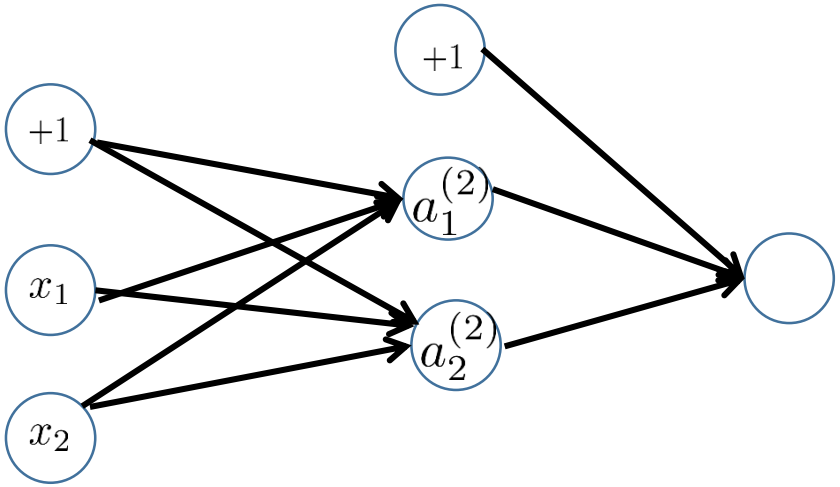
x_1 AND x_2



(NOT x_1) AND (NOT x_2)



x_1 OR x_2



x_1	x_2	$a_1^{(2)}$	$a_2^{(2)}$	$h_\Theta(x)$
0	0			
0	1			
1	0			
1	1			

Code walk though

Classification and Regression toy problems using nnet R package

Neural Network - Classification neuralnet R library.

Activity Sheet

Multi-Class Classification Problem
nnet R package

- Objective:
  - Build multi-class classification neural network model, that takes features as input and predicts the alphabet id
- Data:
  - all_features.txt"
  - Has data that is collected from the image of Hindi alphabet.
  - Class/Target attribute is the alphabet id
    - In the given data set Target variable in the first column
  - Other 72 attributes are features collected from the image of that alphabet
  - Each row has details about one alphabet

Code walk through