CSE 474
Pattern Recognition Sessional

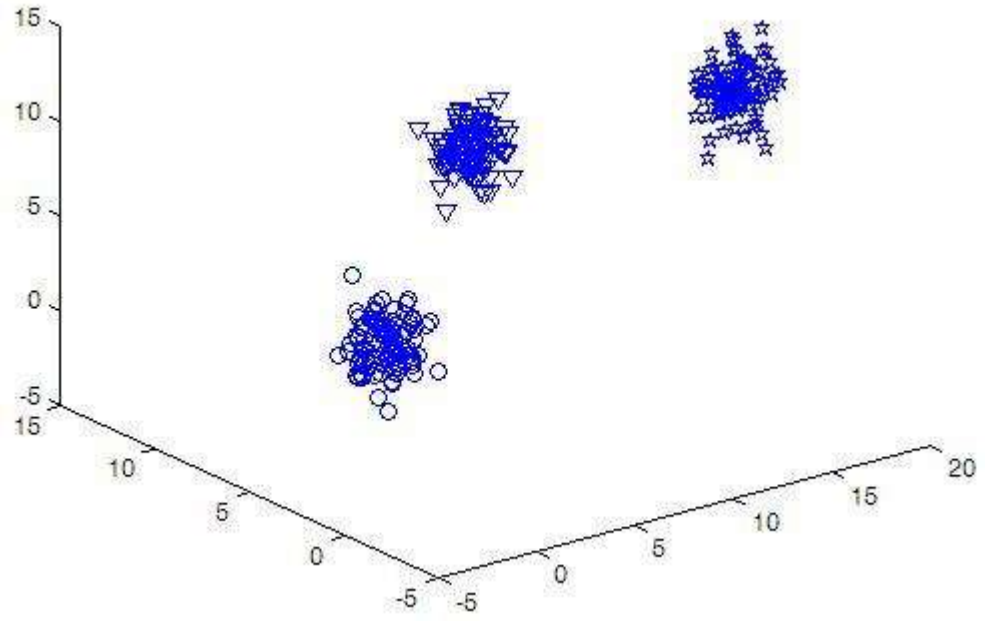
Lab# 3: Implementation of a Classifier using Neural Network

Lab Objective

- Implement a multiclass classifier using Neural Network
  - Number classes: variable
  - Feature dimension: variable
  - Network structure: arbitrary

Training Data

- Assume the following training set
  - Multiple classes
  - Multiple features



What to do

- Assume the following training set
  - All numerical data
  - Features are real numbers
  - Classes are integers

F1	F2	F2	Class
9.4512	7.3199	6.4664	1
10.7276	9.6067	5.9398	2
10.1960	9.3145	8.3873	1
15.7777	1.5879	11.4440	3
15.8685	2.7902	11.2532	3
14.9448	0.7798	12.7481	2

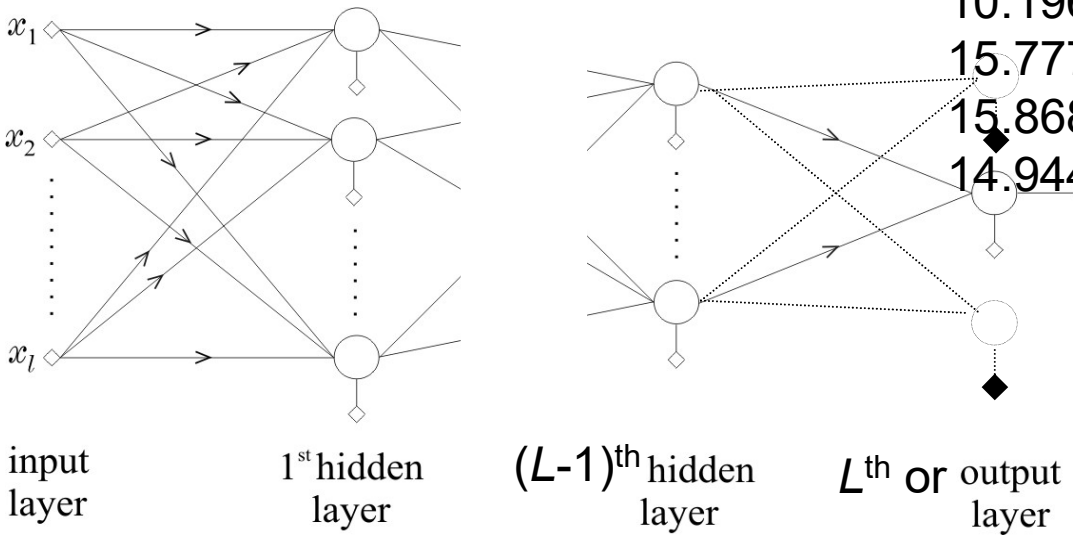
Training Set

What to do

- Use the training set to learn a neural network of *arbitrary structure* using *backpropagation* algorithm

F1	F2	F2	Class
9.4512	7.3199	6.4664	1
10.7276	9.6067	5.9398	2
10.1960	9.3145	8.3873	1
15.7777	1.5879	11.4440	3
15.8685	2.7902	11.2532	3
14.9448	0.7798	12.7481	2

Training Set

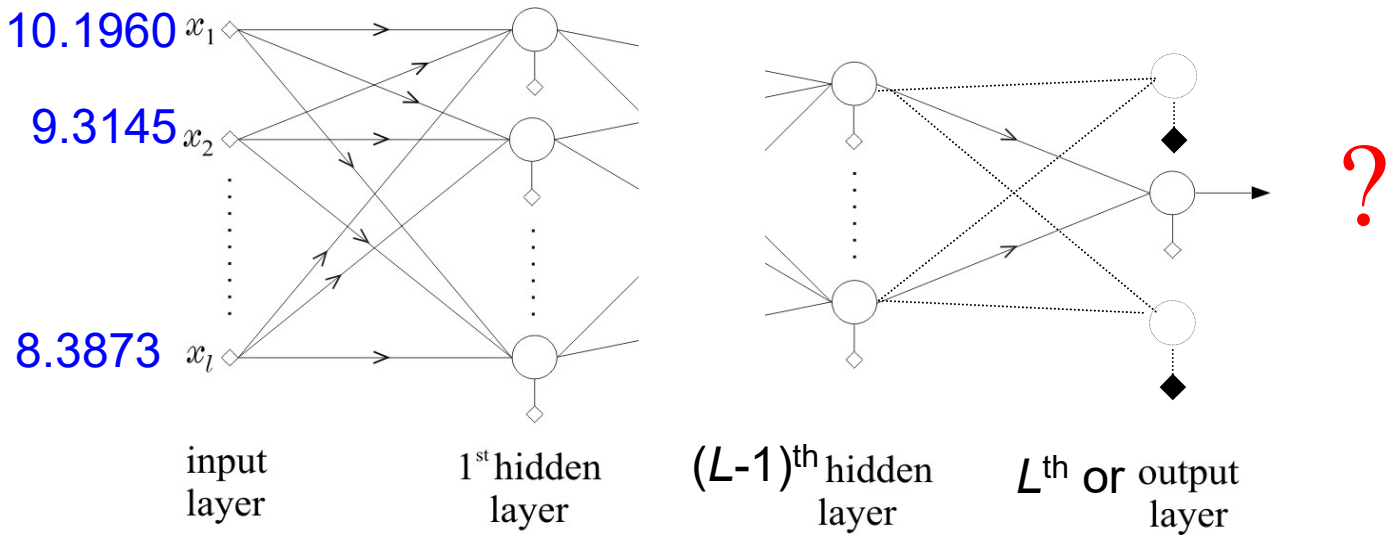


What to do

- Given an unknown sample,

  $[x_1, x_2, x_3]$ = [10.1960 9.3145 8.3873]

Predict its class!



Training and Testing Files

- Each file contains multiple lines
- Each line describes a sample
  - Except the last one, all are real valued features
  - Last number is the class of the sample in integer

- Analyze the training file to know the feature dimension and total number of classes
- You can assume necessary training parameters

Output Submission to Moodle

- Change network structure, e.g., no. of layers and nodes in layers
  - Learn *different networks* from the *supplied training file* using *backpropagation* algorithm
  - Use the corresponding testing file to identify all misclassified samples and report as follows

no. of layers	no. of nodes/layer	accuracy

- Submit the report to moodle in a separate word file

Output during Evaluation

- The instructor may ask you to change network structure and to run the experiment using new training/testing files
  - Learn the network using the new training file
  - Use the corresponding testing file to identify all misclassified samples and report as follows

sample no. feature values actual class predicted class

  - % of accuracy

Other information

- Your program must be able to handle variable no. of features, classes, layers and nodes per layer. Hard coded assumption will NOT be accepted.
- Submission deadline is 10/10/2020 at 9 am
- Sample training and testing files will be available in the moodle
- Follow the algorithms and notations of your text book (e.g., *Pattern Recognition* by S. Theodoridis)
- You can use your own data to judge your code
- Different files will be used during evaluation