

## Experiment 1: Implementation of AND/OR/NOT Gate using Single Layer Perceptron

### Pre-Test

Implementation of AND/OR/NOT Gate using Single Layer Perceptron

Pre Test

1. Which of the following is the truth table of NOT Gate?

☐ A

I/P	O/P
0	0
1	1

☒ B

I/P	O/P
0	1
1	0

☐ C

I/P	O/P
0	0
1	0

☐ D

I/P	O/P
0	1
1	1

Ans is B

2. Two inputs to AND Gate are 0 and 1 respectively. Which of the following will be the output of the AND Gate?

☒ A. 0

2. Two inputs to AND Gate are 0 and 1 respectively. Which of the following will be the output of the AND Gate?

☒ A. 0

☐ B. 1

Ans is A

3. Which of the following is the truth table of OR Gate?

☐ A

I/P #1	I/P #2	O/P
0	0	0
0	1	1
1	0	1
1	1	0

☐ B

I/P #1	I/P #2	O/P
0	0	1
0	1	0
1	0	0
1	1	0

☐ C

I/P #1	I/P #2	O/P
0	0	1
0	1	1
1	0	1
1	1	0

☒ D

I/P #1	I/P #2	O/P
0	0	0
0	1	1
1	0	1
1	1	1

Ans is D

## Simulation:

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Select gate: AND Gate Start Simulation Stop Simulation

### AND Gate Neural Network (NN)

$w_1$ : 1  
 $w_2$ : 1  
Threshold: 2

X: 1  
Y: 1

$w_1=1$   
 $w_2=1$

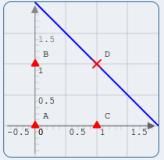
$\Sigma$

$Y' = w_1 \cdot X + w_2 \cdot Y$   
 $= 1 \cdot (X=1) + 1 \cdot (Y=1)$   
 $= 2$

Threshold: 2

$Y' = 2 \geq 2 \Rightarrow Z' = 1$

$Z' = F(Y')$   
 $= 1$



Apply next set of I/P values

### Truth Table of AND Gate

X	Y	Expected O/P	O/P from NN
0	0	0	0
0	1	0	0
1	0	0	0
1	1	1	1

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Select gate: OR Gate Start Simulation Stop Simulation

### OR Gate Neural Network (NN)

$w_1$ : 1  
 $w_2$ : 1  
Threshold: 1

X: 1  
Y: 1

$w_1=1$   
 $w_2=1$

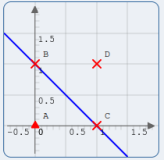
$\Sigma$

$Y' = w_1 \cdot X + w_2 \cdot Y$   
 $= 1 \cdot (X=1) + 1 \cdot (Y=1)$   
 $= 2$

Threshold: 1

$Y' = 2 \geq 1 \Rightarrow Z' = 1$

$Z' = F(Y')$   
 $= 1$



Apply next set of I/P values

### Truth Table of OR Gate

X	Y	Expected O/P	O/P from NN
0	0	0	0
0	1	1	1
1	0	1	1
1	1	1	1

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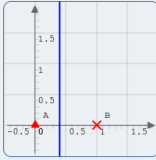
vlabs.iitb.ac.in/vlabs-dev/labs/machine\_learning/labs/exp1/simulation.php

Select gate: NOT Gate Start Simulation Stop Simulation

### NOT Gate Neural Network (NN)

$w_1$  -1  
Threshold: -0.4

X 1  $w_1 = -1$   $Y' = w_1 * X$   
 $= -1 * (X=1)$   
 $= -1$   $Y' = -1 < -0.4 \Rightarrow Z' = 0$   
 $Z' = F(Y')$   
 $= 1$   
 Threshold: -0.4



Apply next set of I/P values

### Truth Table of NOT Gate

X	Expected O/P	O/P from NN
0	1	1
1	0	0

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## Post Test:

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### POST TEST

1. Which of the following can be the correct combination of weights & threshold for the neural network to function as an OR Gate?

☐ A

W1	W2	Threshold
0	0	0

☐ B

W1	W2	Threshold
0	0	1

☐ C

W1	W2	Threshold
1	0	0

☒ D

W1	W2	Threshold
1	1	0.5

**Ans is D**

2. The experiment performed can be considered as an example of which of the following type of learning?

☒ A. Supervised Learning

☐ B. Unsupervised Learning

☐ C. Reinforcement Learning

**Ans is A**

3. Given the weights  $W1 = 0.4$  &  $W2 = 0.3$ , what should be the threshold value for the neural network to function as AND Gate?

☐ A. 0.7

☐ B. 0.5

☐ C. 0.1

☐ D. 0.0

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**Ans is A**

3. Given the weights  $W_1 = 0.4$  &  $W_2 = 0.3$ , what should be the threshold value for the neural network to function as AND Gate?

- ☐ A. Greater than 0 but less than 0.3
- ☐ B. Greater than 0.3 but less than 0.4
- ☒ C. Greater than 0.4 but less than 1
- ☐ D. Greater than 1

**Ans is C**

4. Which of the following Gates cannot be implemented using single layer perceptron model?

- ☐ A. AND
- ☐ B. OR
- ☐ C. NOT
- ☒ D. XOR

**Ans is D**

Hints :-

1. And Gate :- Try using 1.5 as threshold and 1 as weights
2. Or Gate :- Try using 0.5 as threshold and 1 as weights
3. Not Gate :- Try using -0.5 as threshold and -1 as weight

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## Experiment 2: Implementation of AND/OR/NOT Gate using Single Layer Perceptron

### Pre-Test:

Implementation of XOR Gate Using Multi-Layer Perceptron/ Error Back Propagation

Pre Test

How many Layers can be there in FeedForward or EBPMLP algorithms?

☐ A. 3  
☐ B. 1 or more  
☐ C. 2 or more  
☒ D. 3 or more

**Ans is D**

2. Can Ex-OR gate be implemented using single layer perceptron ?

☐ A. Yes  
☒ B. No  
☐ C. Cannot be determined  
☐ D. Maybe

**Ans is B**

3. Neural Networks are complex \_\_\_\_\_ with many parameters.

☒ A. Linear Functions  
☐ B. Non-Linear Functions  
☐ C. Discrete Functions  
☐ D. Exponential Functions

**Ans is A**

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### Simulation:

Select a network:  
Multi-Layer Perceptron

Truth Table

Input		Output			
X1	X2	Output of hidden neuron 1	Output of hidden neuron 2	Final Network Output	Expected Output
0	0	0	0	0	0
0	1	1	1	1	1
1	0	1	1	1	1
1	1	1	1	1	0

Accuracy of network: 75%

Restart simulation

Decision Boundaries

After conversion of Feature space to image space

## Post Test:

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### Post Test

1. Why is the XOR problem exceptionally interesting to neural network researchers?

- ☐ A. Because it can be expressed in a way that allows you to use a neural network
- ☐ B. Because it is complex binary operation that cannot be solved using neural networks
- ☐ C. Because it can be solved by a single layer perceptron
- ☒ D. Because it is the simplest linearly inseparable problem that exists

**Ans is D**

2. What is back propagation?

- ☒ A. It is another name given to the curvy function in the perceptron
- ☐ B. It is the transmission of error back through the network to adjust the inputs
- ☐ C. It is the transmission of error back through the network to allow weights to be adjusted so that the network can learn
- ☐ D. None of the mentioned

**Ans is A**

3. What type of learning algorithm is used in EBPMLP?

- ☐ A. Supervised learning
- ☐ B. Reinforcement learning
- ☒ C. Active learning
- ☐ D. Unsupervised learning

**Ans is C**

4. What effect does the learning rate have?

- ☐ A. Always increases the rate of change of weights
- ☐ B. Always decreases the rate of change of weights
- ☐ C. Increases the rate if value too high and decreases the rate if value too low
- ☒ D. No effect

**Ans is D**

## Experiment 3: Case study explaining function of Optical Character Recognition

### Pre-Test:

The screenshot shows the 'Pre Test' section of the 'Case study explaining function of Optical Character Recognition' lab. The interface includes a sidebar with navigation options: Aim, Theory, Pre Test, Procedure, Simulation, Post Test, and References. The main content area displays three questions:

1. Techniques used in 'character recognition' includes
  - ☐ A. optical character recognition
  - ☐ B. magnetic ink character recognition
  - ☐ C. optical mark reading
  - ☒ D. both a and b

Ans is D
2. OCR (Optical Character Recognition) uses NLP ( Natural Language Processing ).
  - ☒ A. True
  - ☐ B. False

Ans is A
3. What kind of perception is used in printing?
  - ☒ A. Optical character recognition
  - ☐ B. Speech recognition
  - ☐ C. Perception
  - ☐ D. None of the mentioned

Ans is A

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### Simulation:

The screenshot shows the 'Simulation' section of the 'Case study explaining function of Optical Character Recognition' lab. The interface includes a sidebar with navigation options: Aim, Theory, Pre Test, Procedure, Simulation, Post Test, and References. The main content area displays a simulation environment with a 'Browse...' button, a 'Run' button, and a 'Pop Up Procedure' button. A terminal window shows the following code:

```
python3 ocr.py
python3 ocr.py --img 7.png
python3 ocr.py --img 7.png --threshold 0.3
python3 ocr.py --img 7.png --threshold 0.3 --weights 0.4 0.3
python3 ocr.py --img 7.png --threshold 0.3 --weights 0.4 0.3 --bias 1.5
```

A green arrow icon labeled 'recognizing text' is shown with a progress bar at 100%.

Bounding Boxes Visibility: ☒

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### Post Test:

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### Case study explaining function of Optical Character Recognition

#### Post Test

1. Which of these is not a technique of Pre-processing ?

- ☐ A. Binarization
- ☐ B. Noise Reduction
- ☐ C. Skew Correction
- ☒ D. Zoning

**Ans is D**

2. Which of these is not a technique of Feature Extraction ?

- ☐ A. Projection Histograms
- ☐ B. Profiles
- ☐ C. Global transformations and moments
- ☒ D. Slant Removal

**Ans is D**

3. Which of these is a correct sequence in Optical Character Recognition ?

- ☒ A.
  1. Segmentation
  2. Pre-processing
  3. Post-processing
  4. Feature Extraction
  5. Classification
- ☐ B.

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### Case study explaining function of Optical Character Recognition

#### Post Test

3. Which of these is a correct sequence in Optical Character Recognition ?

- ☒ A.
  1. Segmentation
  2. Pre-processing
  3. Post-processing
  4. Feature Extraction
  5. Classification
- ☐ B.
  1. Segmentation
  2. Pre-processing
  3. Feature Extraction
  4. Post-processing
  5. Classification
- ☐ C.
  1. Pre-processing
  2. Segmentation
  3. Feature Extraction
  4. Classification
  5. Post-processing
- ☐ D.
  1. Pre-processing
  2. Post-processing
  3. Feature Extraction
  4. Segmentation
  5. Classification

**Ans is A**

4. Which of these segmentation techniques is used to extract words ?

- ☒ A. Explicit Segmentation
- ☐ B. Implicit Segmentation

**Ans is A**

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# Feedback

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Date: 15/10/2022 Current Semester: Semester VII User: Workshop User

\* All fields of first row are mandatory

Discipline	Lab Name	Experiment Name	Add More Rows
Computer Science & Engineering	Machine Learning Lab	Implementation of AND/OR/NOT Gate using Single L	X
Computer Science & Engineering	Machine Learning Lab	Implementation of XOR Gate Using Multi-Layer Perce	X
Computer Science & Engineering	Machine Learning Lab	Case study explaining function of Optical Character R	X
Select Discipline			X
Select Discipline			X
Select Discipline			X
Select Discipline			X

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## Questionnaire

Please indicate your agreement with the following statements

The degree to which the actual lab environment is simulated \*

☐ Excellent ☒ Very Good ☐ Good ☐ Fair ☐ Poor

The manuals were to be found helpful \*

☐ Excellent ☒ Very Good ☐ Good ☐ Fair ☐ Poor

The results of experiment were easily interpretable \*

☐ Excellent ☒ Very Good ☐ Good ☐ Fair ☐ Poor

Please tell your agreement with the following statements

Did you get the feeling of actual lab while performing the experiments \*

☒ Yes ☐ No

Do you think performing experiments through Virtual Labs is more challenging than the real lab experiments \*

☒ Yes ☐ No

Do you think performing experiments through Virtual Labs gives scope for more innovative and creative research work \*

☒ Yes ☐ No

Did you go through the manual / step by step method before performing the live experiments \*

☒ Yes ☐ No

Do you find the theory part useful \*

☒ Yes ☐ No

How helpful is the system \*

Nice Simulation

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Do you find the theory part useful \*

Yes No

How helpful is the system \*

Nice Simulation

Specify the problems/difficulties you faced while performing the experiments \*

Few Instructions Unclear

Indicate aspects you found interesting about the experiments \*

Simulation

Submit