

## ASHUTOSH GUPTA(MIT2020029)

### Ques 1. BIDIRECTIONAL ASSOCIATIVE MEMORY (BAM)

- A bidirectional associative memory stores a set of pattern associations by summing bipolar correlation matrices (an  $n$  by  $m$  outer product matrix for each pattern to be stored).
- The architecture of the net consists of two layers of neurons, connected by directional weighted connection paths.
- The net iterates, sending signals back and forth between the two layers until all neurons reach equilibrium (i.e., until each neuron's activation remains constant for several steps).
- Bidirectional associative memory neural nets can respond to input to either layer. Because the weights are bidirectional and the algorithm alternates between updating the activations for each layer, we shall refer to the layers as the X-layer and the Y-layer (rather than the input and output layers).

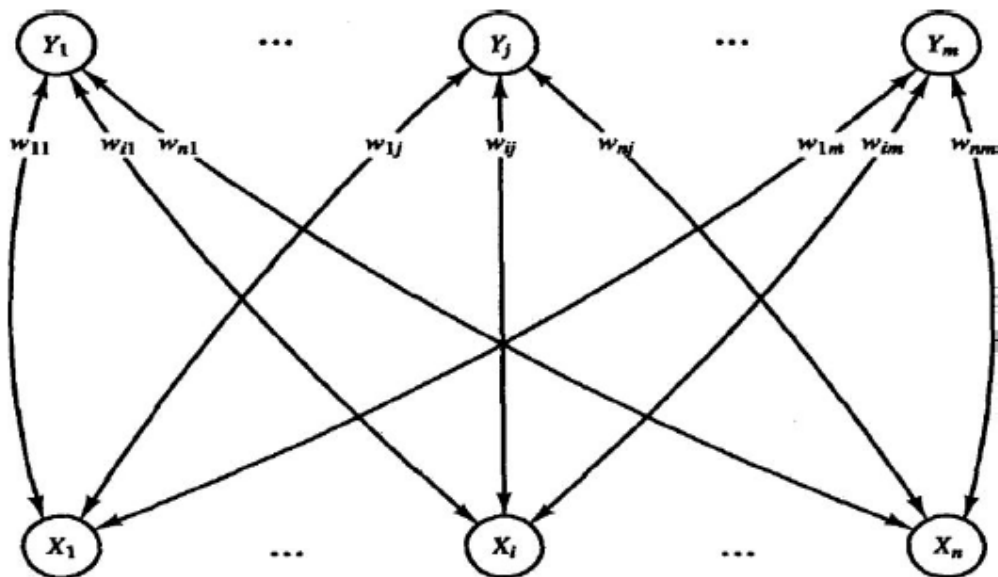


Figure: Bidirectional Associative Memory (BAM)

## OBSERVATIONS-

### For SET A-

Weight matrix:

```
[[2 2 4]
 [4 0 2]
 [2 2 0]
 [0 4 2]
 [0 4 2]
 [0 4 2]]
```

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Testing for input patterns: Set A

Output of input pattern 1

```
[[1]
 [1]
 [1]]
```

Output of input pattern 2

```
[[ -1]
 [ -1]
 [ -1]]
```

Output of input pattern 3

```
[[ -1]
 [ 1]
 [ 1]]
```

Output of input pattern 4

```
[[ 1]
 [-1]
 [ 1]]
```

accuracy:

1.0

## FOR SET B-

Testing for target patterns: Set B

Output of target pattern 1

```
[[1]
 [1]
 [1]
 [1]
 [1]
 [1]]
```

Output of target pattern 2

```
[[ -1]
 [ -1]
 [ -1]
 [ -1]
 [ -1]
 [ -1]]
```

Output of target pattern 3

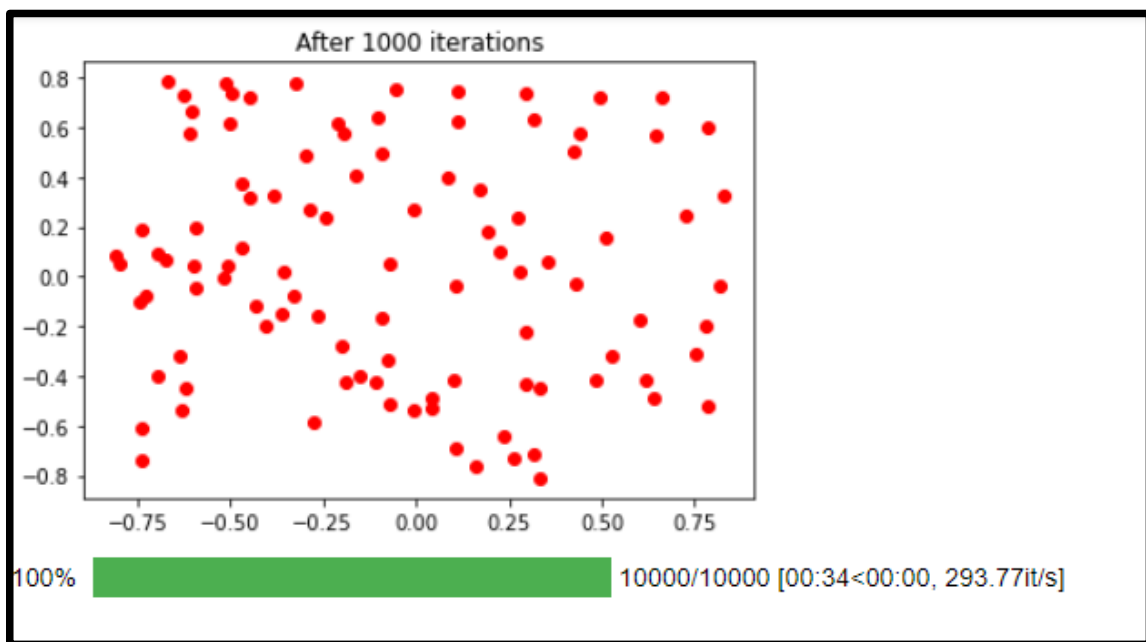
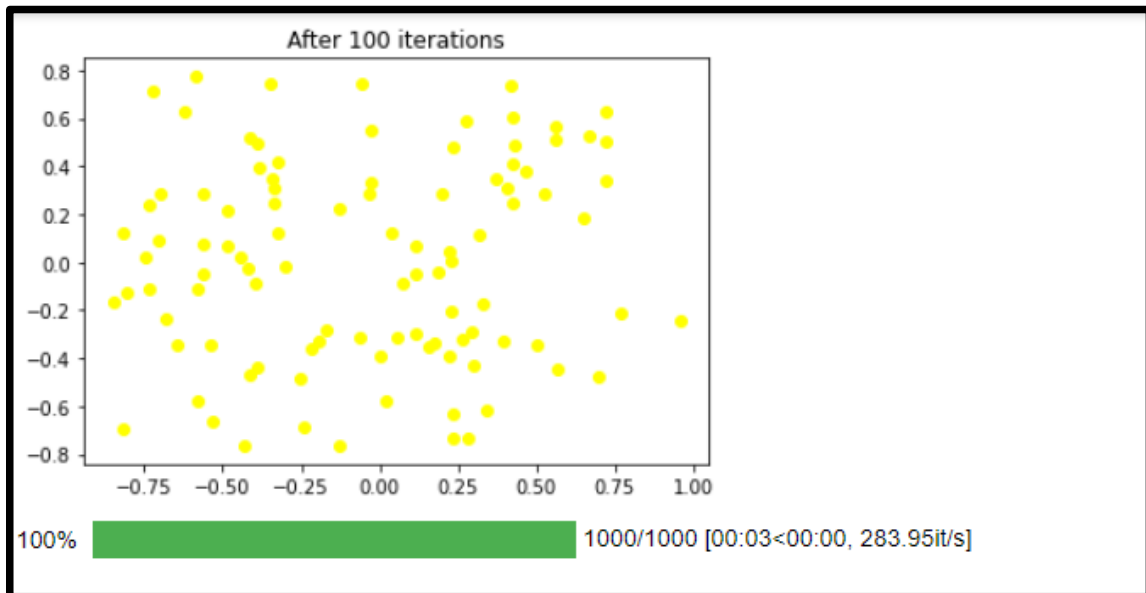
```
[[ 1]
 [ -1]
 [ -1]
 [ 1]
 [ 1]
 [ 1]]
```

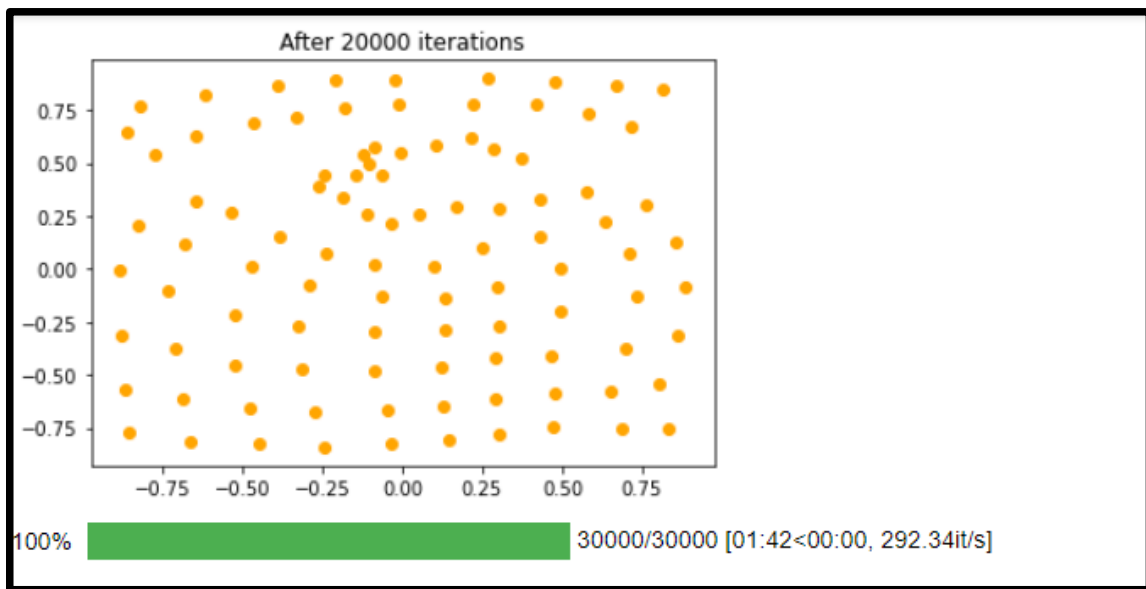
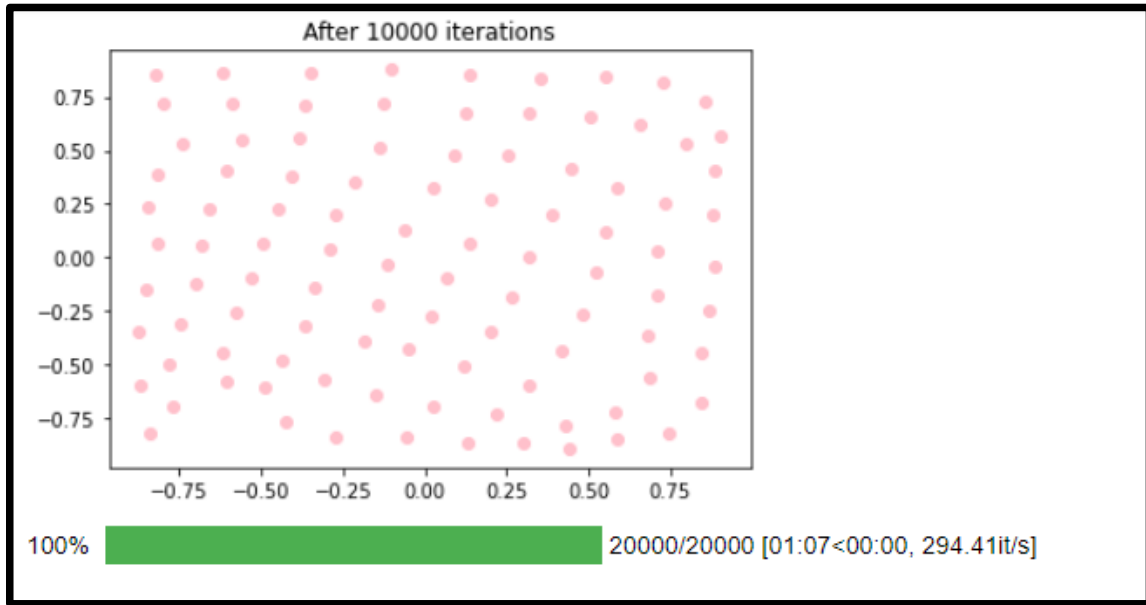
Output of target pattern 4

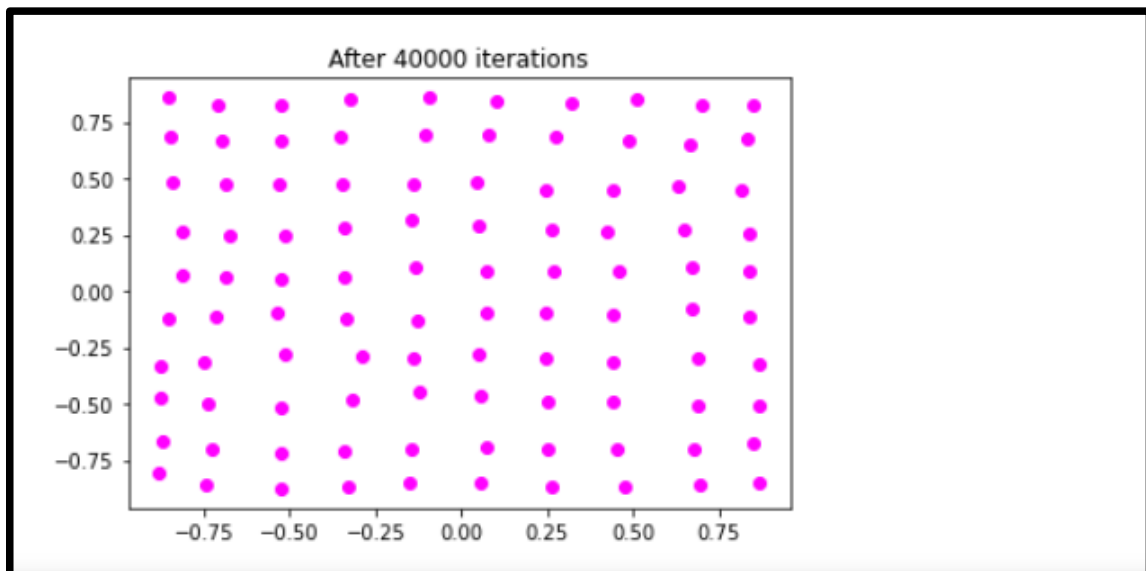
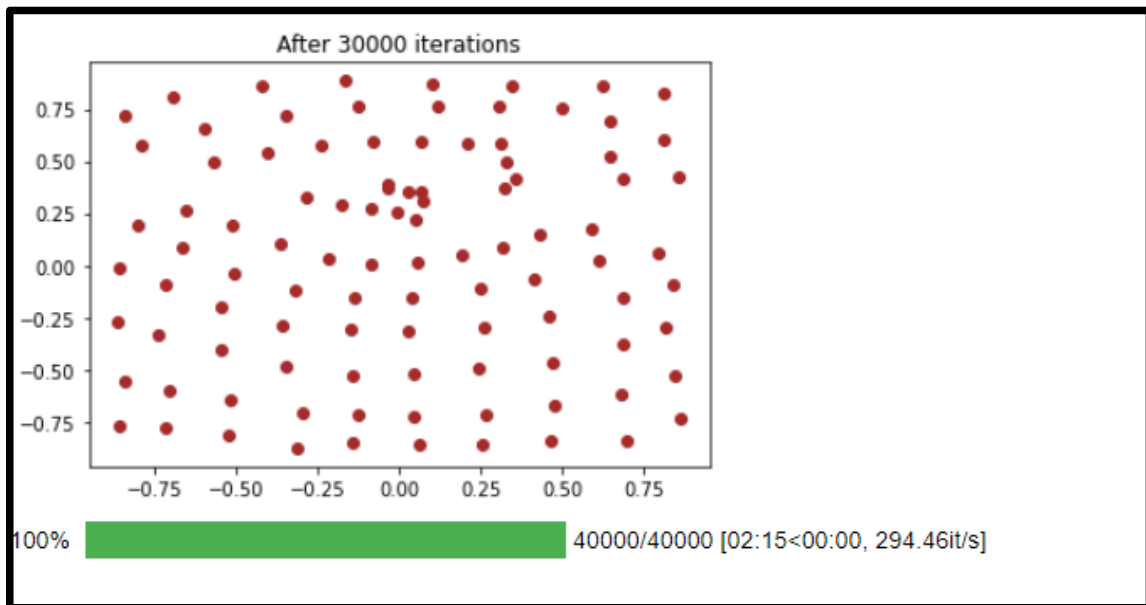
```
[[ 1]
 [ 1]
 [ -1]
 [ -1]
 [ -1]
 [ -1]]
```

100%  100/100 [05:44<00:00, 3.44s/it]

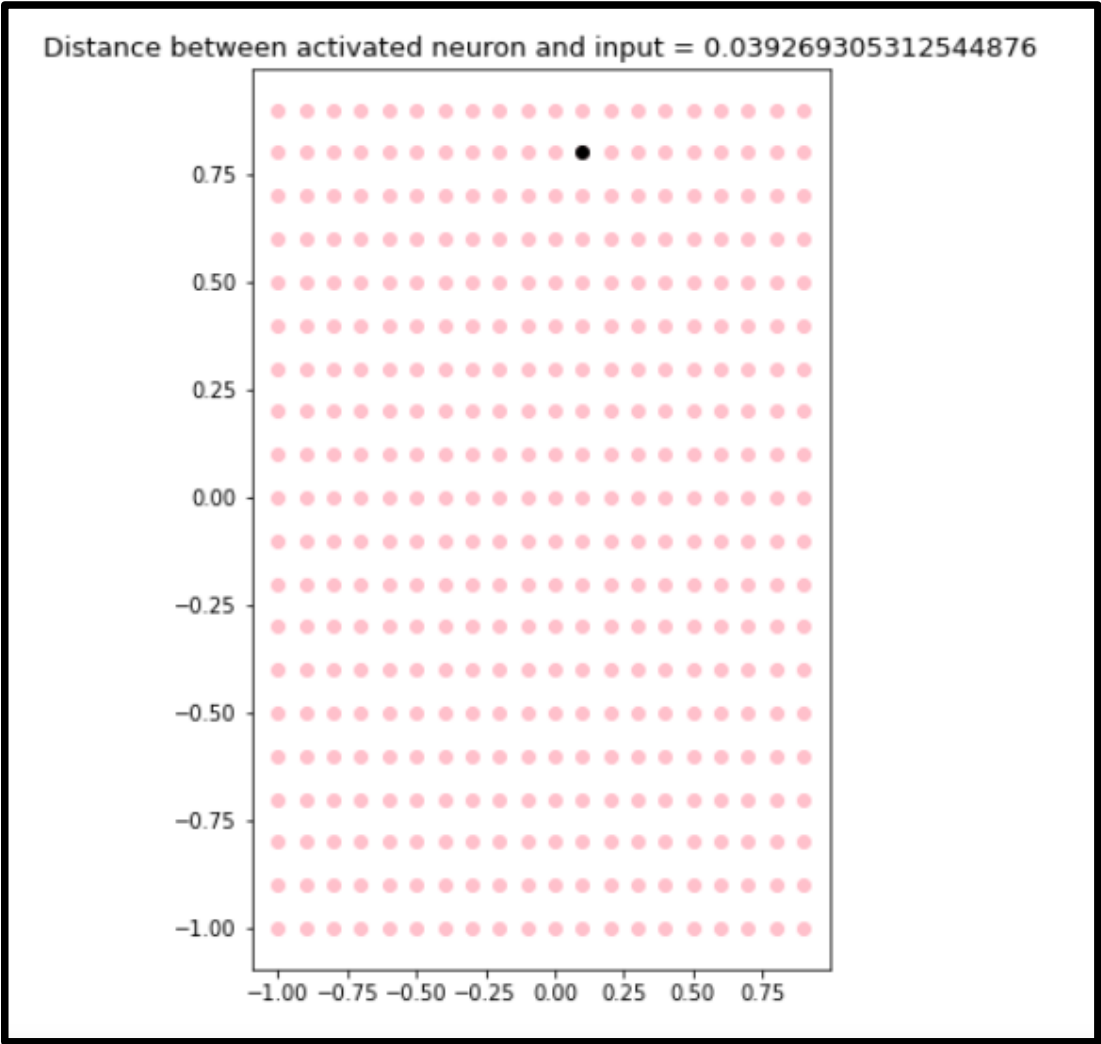
## Ques 2. Training Table



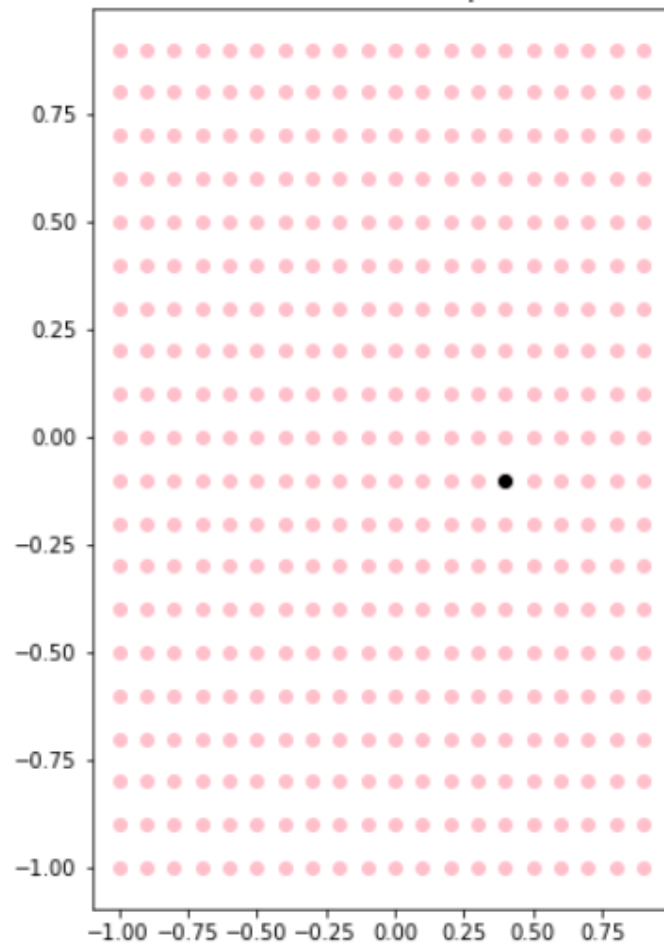




TESTING TABLE-

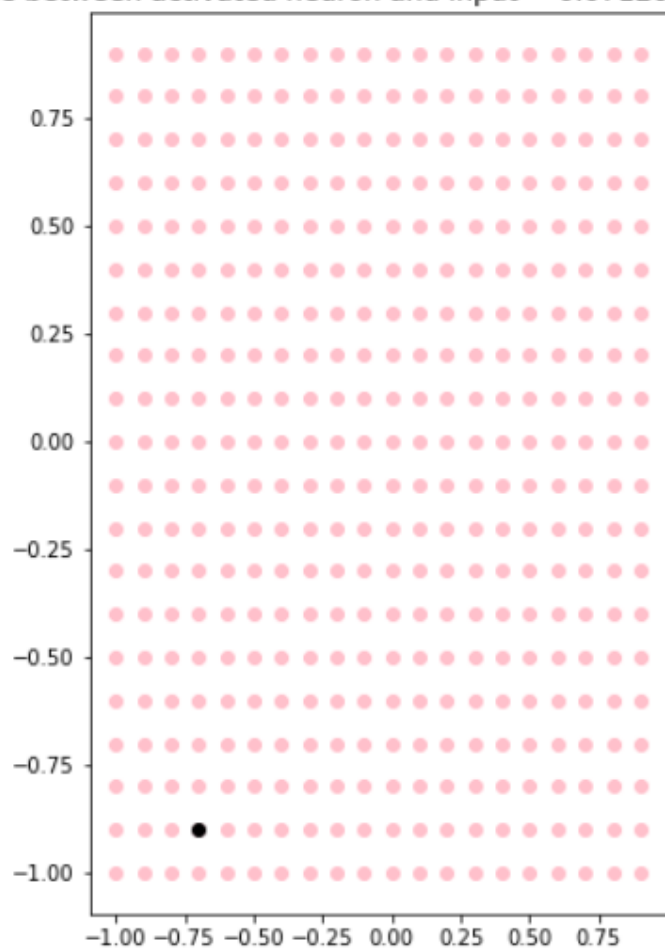


Distance between activated neuron and input = 0.11062274314732969





Distance between activated neuron and input = 0.0712028533266887



Distance between activated neuron and input = 0.1073703350083033

