Hypothesis : The probability of "success" is directly proportional to the distance between the positive and negative data, inversely proportional to the input dimension, and directly proportional to the number of nodes in the hidden layer.

Data : ball-shell dataset
Number of samples : 500
rb : radius of ball (positive data(ball) is from 0 to rb.)
rs : radius of shell (thickness of shell is fixed to 1 so negative data(shell) is from rs-0.5 to rs+0.5.)
d : distance between the positive and negative data ((rs-0.5)-rb)
n : list of number of nodes in the hidden layer

For training stopping conditions are:

1. Minimum 50 epochs
2. Maximum 400 epochs
3. Best_accuracy - accuracy >= 5
4. Accuracy is not changing for last 20 epochs

initialisation_method = 'xavier'
optimisation_method = 'sgdwm'
learning_rate = 0.05, momentum = 0.9

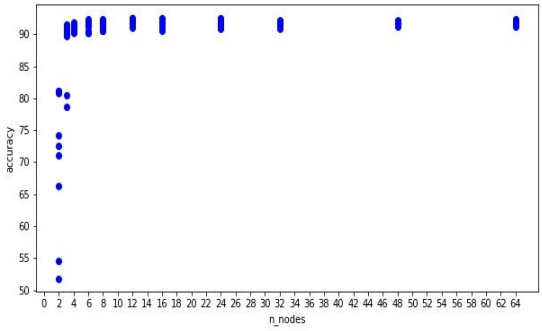
Experiment 3
points_dim = [2, 4, 8, 16, 32]
radius_of_sphere = 1
radius_of_shell = [1.2, 1.4, 1.6, 1.8, 2]
thickness_of_shell = 1
Random_seed = [100, 200, 300, 400, 500, 600, 700, 800, 900, 1000]
N_nodes = [2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 64]
Hidden layer : 1, 2

Base Risk:

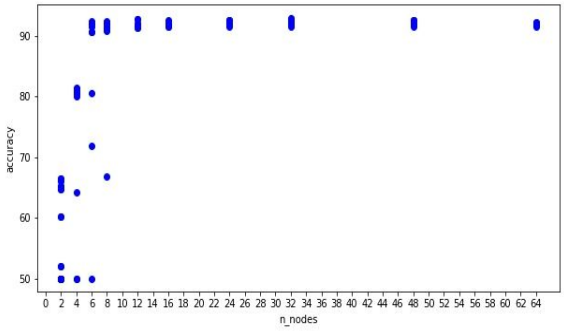
shell_radius	dimension				
	2	4	8	16	32
1.2	0.10625	0.04684	0.00676	0.0001024	2.1115e-08
1.4	0.03393	0.01389	0.00168	1.4123e-05	5.8034e-10

Comparing number of layers with different number of nodes:
Accuracy is less for 2 layers(<16 nodes) than the same number of nodes in 1 layer (<16nodes).

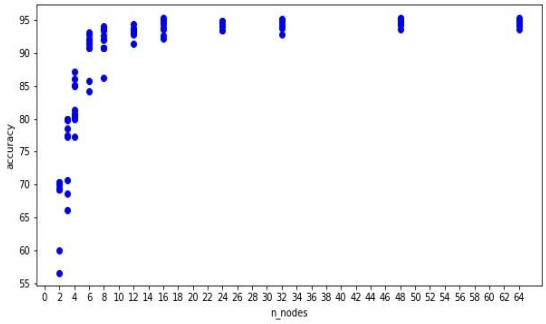
dimension=2,shell_radius=1.2,layer=1



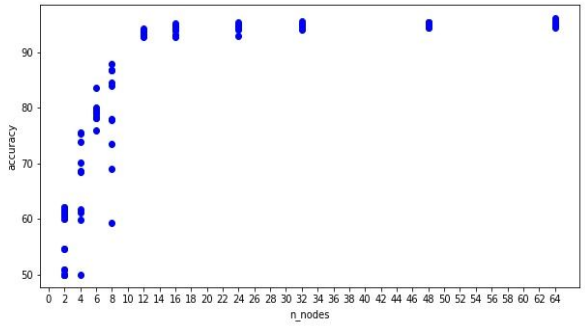
dimension=2,shell_radius=1.2,layer=2



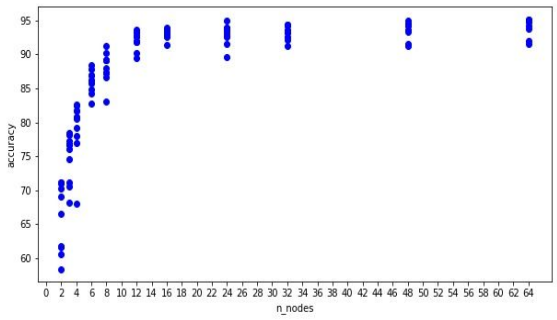
dimension=4,shell_radius=1.2,layer=1



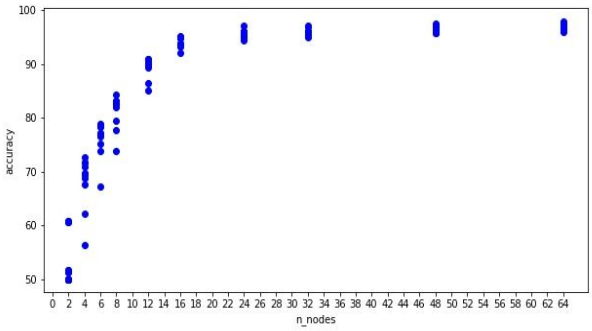
dimension=4,shell_radius=1.2,layer=2



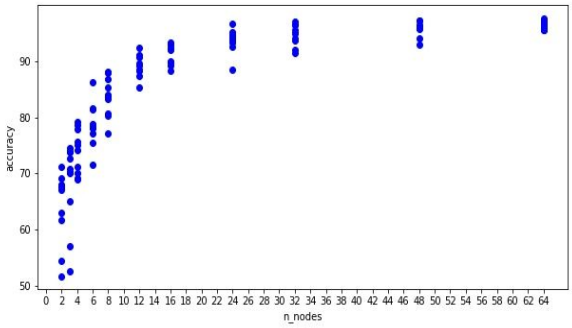
dimension=8,shell_radius=1.2,layer=1



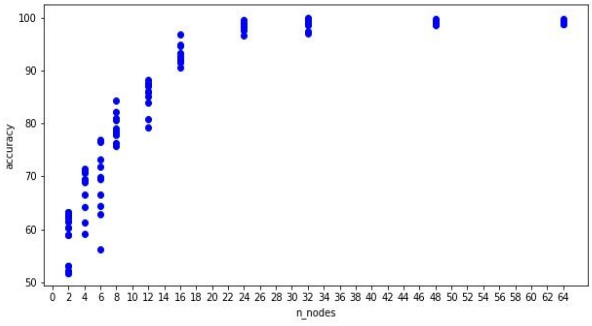
dimension=8,shell_radius=1.2,layer=2



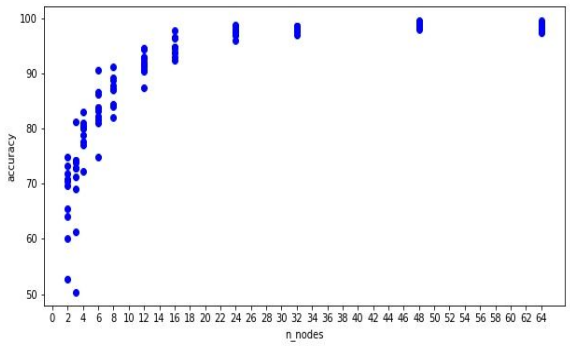
dimension=16,shell_radius=1.2,layer=1



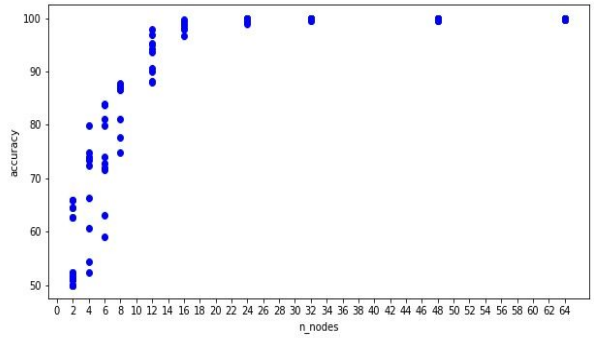
dimension=16,shell_radius=1.2,layer=2



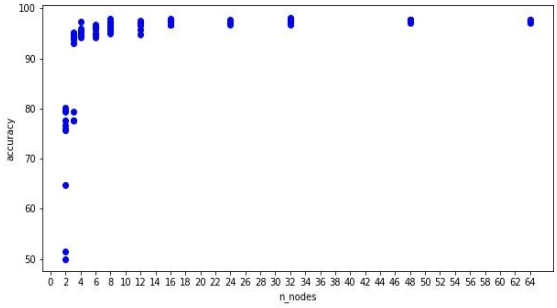
dimension=32,shell_radius=1.2,layer=1



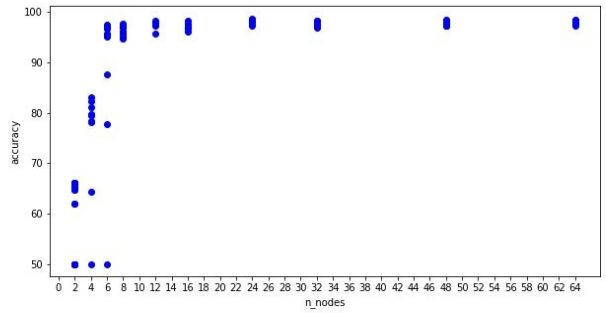
dimension=32,shell_radius=1.2,layer=2



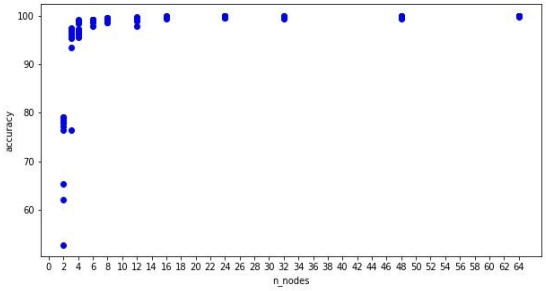
dimension=2,shell_radius=1.4,layer=1



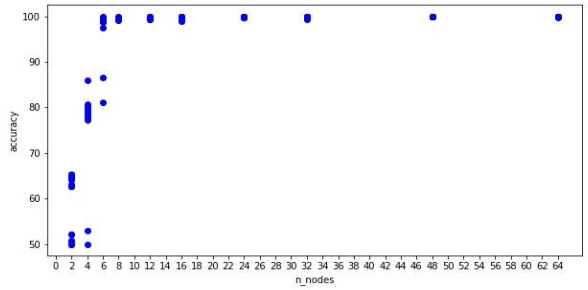
dimension=2,shell_radius=1.4,layer=2



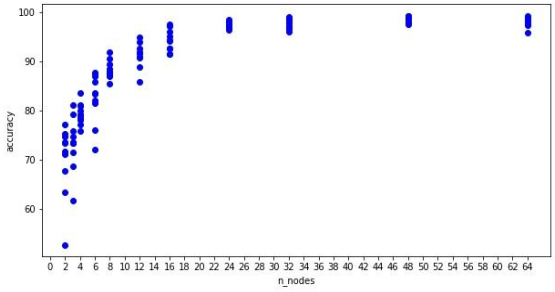
dimension=2,shell_radius=1.6,layer=1



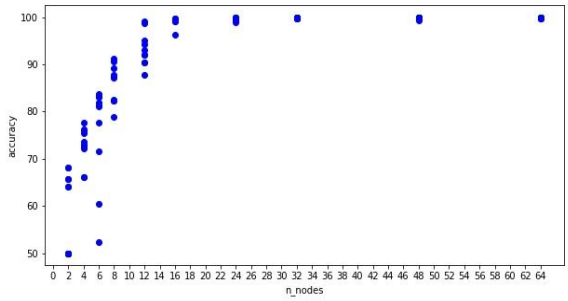
dimension=2,shell_radius=1.6,layer=2

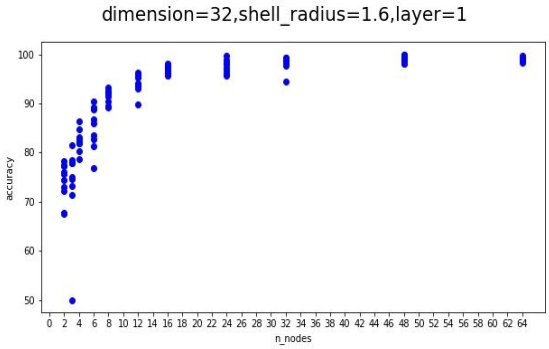


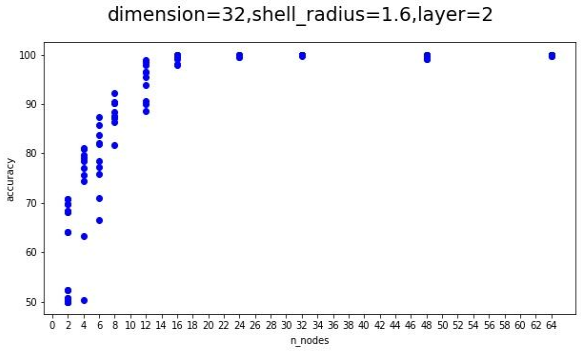
dimension=32,shell_radius=1.4,layer=1



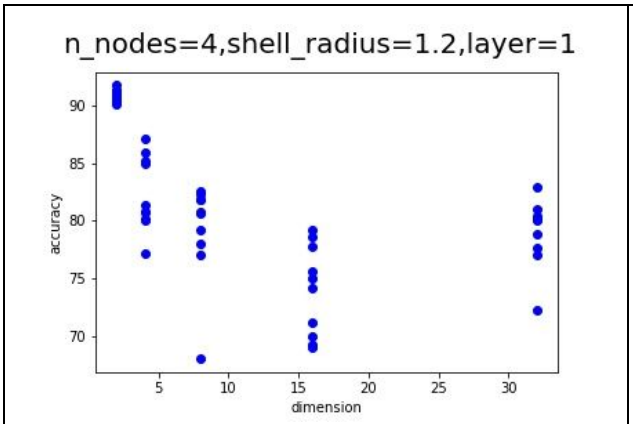
dimension=32,shell_radius=1.4,layer=2

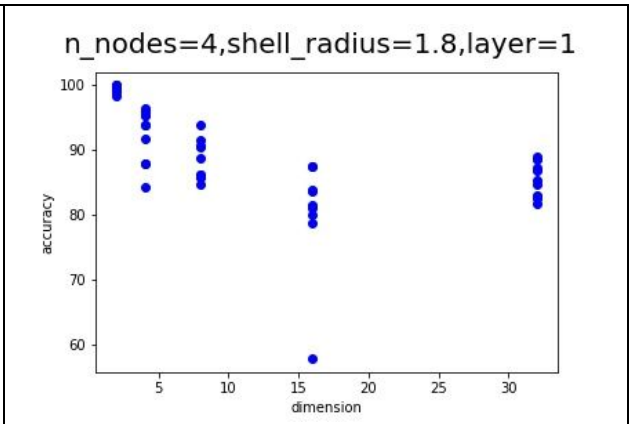


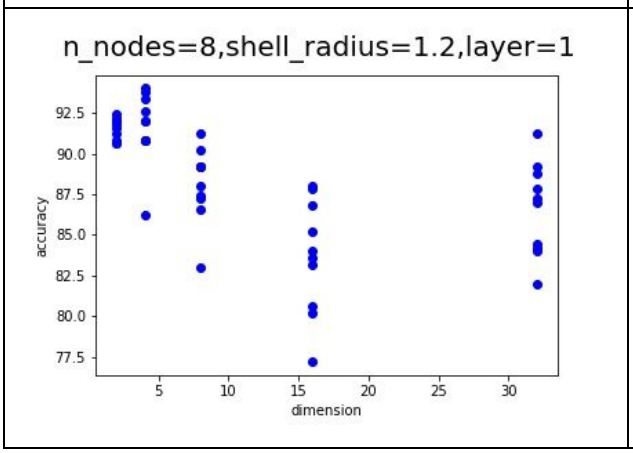


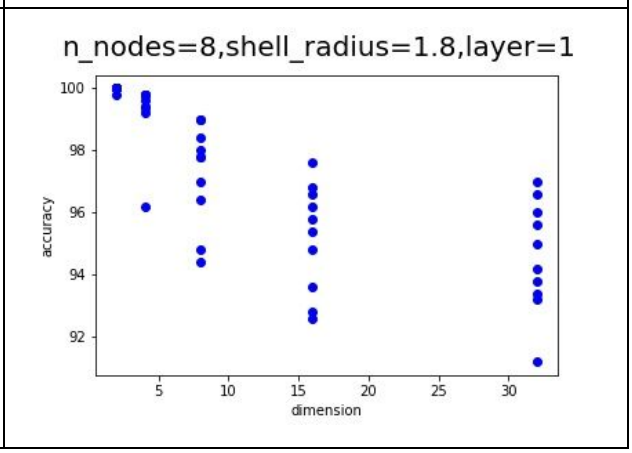


Comparing dimension: it achieves better accuracy on 32 dimensions data compared to 16 dimensions data.

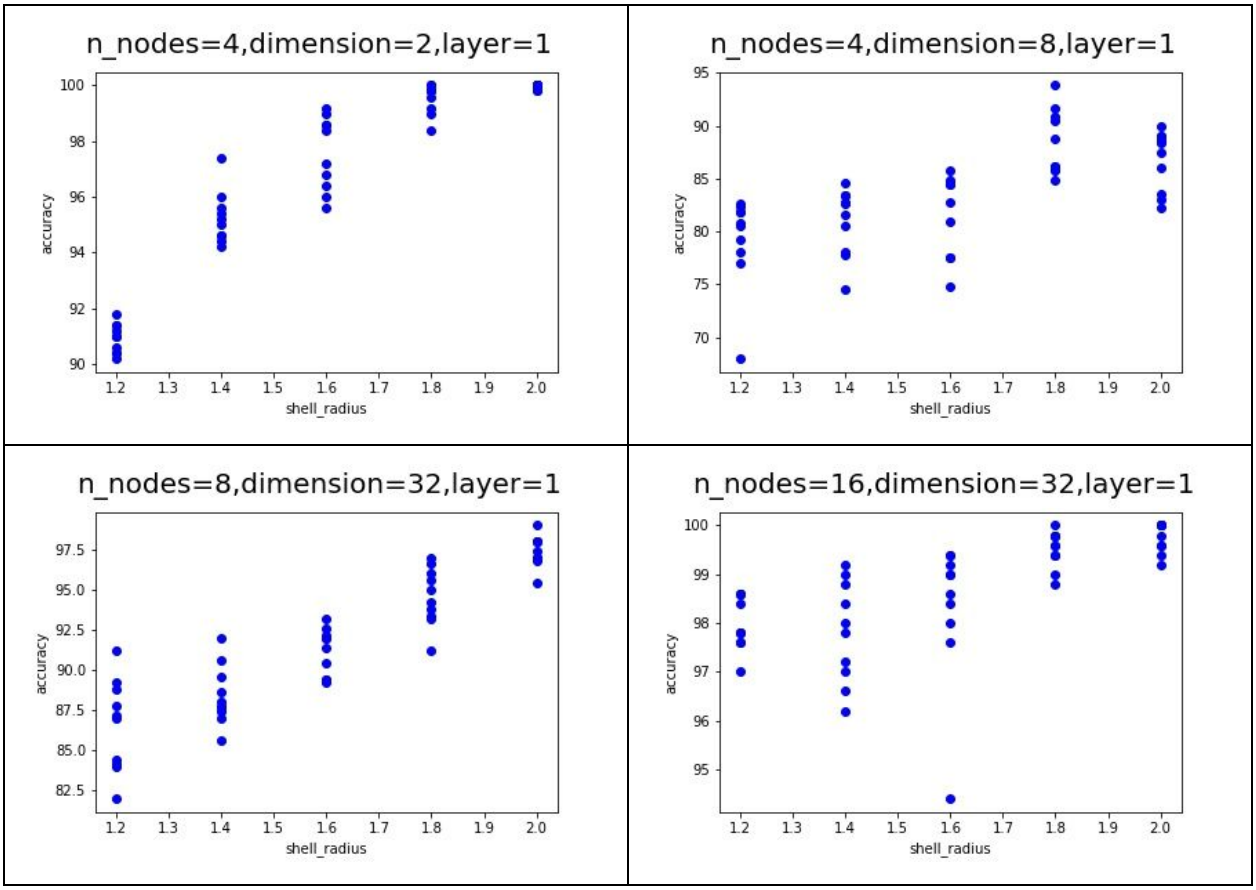








Comparing shell_radius:
Accuracy is increasing as distance between data increases.


n_nodes=4,dimension=2,layer=1
accuracy
shell_radius
n_nodes=4,dimension=8,layer=1
accuracy
shell_radius
n_nodes=8,dimension=32,layer=1
accuracy
shell_radius
n_nodes=16,dimension=32,layer=1
accuracy
shell_radius