Dataset yang digunakan : Car Evaluation

A. ReLU

1. Hidden Layer 1, jumlah neuron 4 , epoch 1 , learning rate 10 , Batch Size 16

```
Epoch [1/1], Loss: 1.7536
Test Accuracy: 67.92%
```

2. Hidden Layer 2, jumlah neuron 4 8 , epoch 10 , learning rate 1 , Batch Size 32

```
Epoch [1/10], Loss: 0.8124
Epoch [2/10], Loss: 0.7009
Epoch [3/10], Loss: 0.6385
Epoch [4/10], Loss: 0.6305
Epoch [5/10], Loss: 0.5996
Epoch [6/10], Loss: 0.6032
Epoch [7/10], Loss: 0.6463
Epoch [8/10], Loss: 0.6014
Epoch [9/10], Loss: 0.5886
Epoch [10/10], Loss: 0.5961
Test Accuracy: 74.28%
```

3. Hidden Layer 3, jumlah neuron 4 8 16 , epoch 25 , learning rate 0.1 , Batch Size 64

```
Epoch [1/25], Loss: 1.0310
Epoch [2/25], Loss: 0.8382
Epoch [3/25], Loss: 0.8205
Epoch [4/25], Loss: 0.8177
Epoch [5/25], Loss: 0.8054
Epoch [6/25], Loss: 0.7933
Epoch [7/25], Loss: 0.7865
Epoch [8/25], Loss: 0.7719
Epoch [9/25], Loss: 0.7533
Epoch [10/25], Loss: 0.7385
Epoch [11/25], Loss: 0.7278
Epoch [12/25], Loss: 0.7136
Epoch [13/25], Loss: 0.7057
Epoch [14/25], Loss: 0.6982
Epoch [15/25], Loss: 0.6885
Epoch [16/25], Loss: 0.6769
Epoch [17/25], Loss: 0.6624
Epoch [18/25], Loss: 0.6493
Epoch [19/25], Loss: 0.6280
Epoch [20/25], Loss: 0.6156
Epoch [21/25], Loss: 0.5938
Epoch [22/25], Loss: 0.5843
Epoch [23/25], Loss: 0.5827
Epoch [24/25], Loss: 0.5688
Epoch [25/25], Loss: 0.5661
Test Accuracy: 73.41%
```

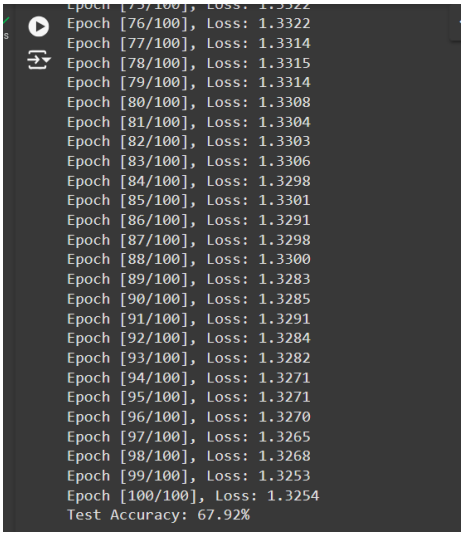
4. Hidden Layer 1, jumlah neuron 8 , epoch 25, learning rate 0.01 , Batch Size 128

```
Epoch [1/25], Loss: 1.3119
Epoch [2/25], Loss: 1.1504
Epoch [3/25], Loss: 1.0459
Epoch [4/25], Loss: 0.9779
Epoch [5/25], Loss: 0.9362
Epoch [6/25], Loss: 0.9082
Epoch [7/25], Loss: 0.8881
Epoch [8/25], Loss: 0.8738
Epoch [9/25], Loss: 0.8617
Epoch [10/25], Loss: 0.8556
Epoch [11/25], Loss: 0.8454
Epoch [12/25], Loss: 0.8410
Epoch [13/25], Loss: 0.8356
Epoch [14/25], Loss: 0.8327
Epoch [15/25], Loss: 0.8261
Epoch [16/25], Loss: 0.8240
Epoch [17/25], Loss: 0.8214
Epoch [18/25], Loss: 0.8175
Epoch [19/25], Loss: 0.8142
Epoch [20/25], Loss: 0.8112
Epoch [21/25], Loss: 0.8100
Epoch [22/25], Loss: 0.8087
Epoch [23/25], Loss: 0.8043
Epoch [24/25], Loss: 0.8017
Epoch [25/25], Loss: 0.7996
Test Accuracy: 67.92%
```

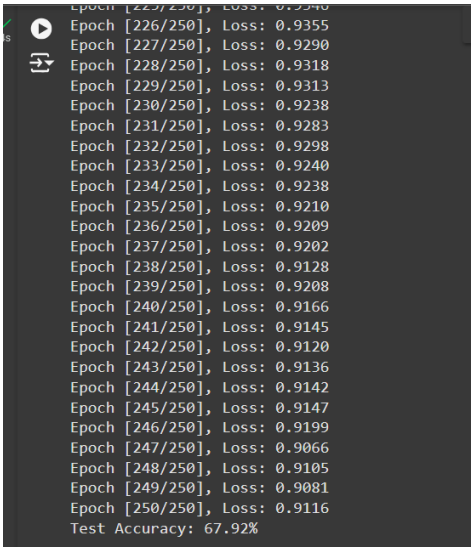
5. Hidden Layer 2, jumlah neuron 16 32, epoch 50, learning rate 0.001 , Batch Size 256

```
Epoch [22/50], Loss: 1.1996
Epoch [23/50], Loss: 1.1973
Epoch [24/50], Loss: 1.1895
Epoch [25/50], Loss: 1.1856
Epoch [26/50], Loss: 1.1806
Epoch [27/50], Loss: 1.1731
Epoch [28/50], Loss: 1.1646
Epoch [29/50], Loss: 1.1606
Epoch [30/50], Loss: 1.1557
Epoch [31/50], Loss: 1.1472
Epoch [32/50], Loss: 1.1436
Epoch [33/50], Loss: 1.1373
Epoch [34/50], Loss: 1.1387
Epoch [35/50], Loss: 1.1253
Epoch [36/50], Loss: 1.1271
Epoch [37/50], Loss: 1.1210
Epoch [38/50], Loss: 1.1108
Epoch [39/50], Loss: 1.1063
Epoch [40/50], Loss: 1.1018
Epoch [41/50], Loss: 1.1009
Epoch [42/50], Loss: 1.0891
Epoch [43/50], Loss: 1.0856
Epoch [44/50], Loss: 1.0802
Epoch [45/50], Loss: 1.0764
Epoch [46/50], Loss: 1.0760
Epoch [47/50], Loss: 1.0712
Epoch [48/50], Loss: 1.0660
Epoch [49/50], Loss: 1.0597
Epoch [50/50], Loss: 1.0537
Test Accuracy: 67.92%
```

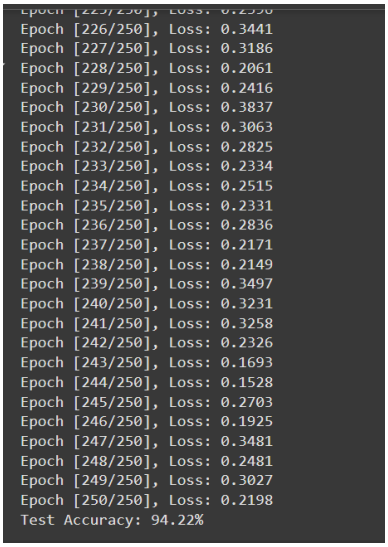
6. Hidden Layer 3, jumlah neuron 16 32 64, epoch 100, learning rate 0.0001 , Batch Size 512



7. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 0.001 , Batch Size 512



8. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 1 , Batch Size 512



9. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [226/250], Loss: 0.3295
Epoch [227/250], Loss: 0.3411
Epoch [228/250], Loss: 0.3247
Epoch [229/250], Loss: 0.3016
Epoch [230/250], Loss: 0.3051
Epoch [231/250], Loss: 0.3292
Epoch [232/250], Loss: 0.3734
Epoch [233/250], Loss: 0.3781
Epoch [234/250], Loss: 0.3554
Epoch [235/250], Loss: 0.3046
Epoch [236/250], Loss: 0.2823
Epoch [237/250], Loss: 0.2778
Epoch [238/250], Loss: 0.2753
Epoch [239/250], Loss: 0.2729
Epoch [240/250], Loss: 0.2804
Epoch [241/250], Loss: 0.2848
Epoch [242/250], Loss: 0.3325
Epoch [243/250], Loss: 0.3885
Epoch [244/250], Loss: 0.3814
Epoch [245/250], Loss: 0.3355
Epoch [246/250], Loss: 0.2830
Epoch [247/250], Loss: 0.2706
Epoch [248/250], Loss: 0.2639
Epoch [249/250], Loss: 0.2615
Epoch [250/250], Loss: 0.2693
Test Accuracy: 86.71%
```

10. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [226/250], Loss: 0.3291
Epoch [227/250], Loss: 0.3602
Epoch [228/250], Loss: 0.5526
Epoch [229/250], Loss: 0.4611
Epoch [230/250], Loss: 0.3255
Epoch [231/250], Loss: 0.3169
Epoch [232/250], Loss: 0.3164
Epoch [233/250], Loss: 0.3132
Epoch [234/250], Loss: 0.3141
Epoch [235/250], Loss: 0.3162
Epoch [236/250], Loss: 0.3245
Epoch [237/250], Loss: 0.3050
Epoch [238/250], Loss: 0.3066
Epoch [239/250], Loss: 0.3033
Epoch [240/250], Loss: 0.3209
Epoch [241/250], Loss: 0.3103
Epoch [242/250], Loss: 0.3090
Epoch [243/250], Loss: 0.3032
Epoch [244/250], Loss: 0.2980
Epoch [245/250], Loss: 0.3027
Epoch [246/250], Loss: 0.2938
Epoch [247/250], Loss: 0.2936
Epoch [248/250], Loss: 0.3292
Epoch [249/250], Loss: 0.3690
Epoch [250/250], Loss: 0.3856
Test Accuracy: 81.21%
```

11. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [229/250], Loss: 0.0810
Epoch [230/250], Loss: 0.0746
Epoch [231/250], Loss: 0.0756
Epoch [232/250], Loss: 0.0637
Epoch [233/250], Loss: 0.0811
Epoch [234/250], Loss: 0.1870
Epoch [235/250], Loss: 0.1604
Epoch [236/250], Loss: 0.0628
Epoch [237/250], Loss: 0.0564
Epoch [238/250], Loss: 0.0733
Epoch [239/250], Loss: 0.0658
Epoch [240/250], Loss: 0.0945
Epoch [241/250], Loss: 0.3559
Epoch [242/250], Loss: 0.5546
Epoch [243/250], Loss: 0.2431
Epoch [244/250], Loss: 0.1033
Epoch [245/250], Loss: 0.0819
Epoch [246/250], Loss: 0.0706
Epoch [247/250], Loss: 0.0645
Epoch [248/250], Loss: 0.0527
Epoch [249/250], Loss: 0.0609
Epoch [250/250], Loss: 0.1094
Test Accuracy: 97.40%
```

12. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [228/250], Loss: 0.3134
Epoch [229/250], Loss: 0.3120
Epoch [230/250], Loss: 0.3102
Epoch [231/250], Loss: 0.3092
Epoch [232/250], Loss: 0.3032
Epoch [233/250], Loss: 0.3055
Epoch [234/250], Loss: 0.3041
Epoch [235/250], Loss: 0.3110
Epoch [236/250], Loss: 0.3194
Epoch [237/250], Loss: 0.3251
Epoch [238/250], Loss: 0.3067
Epoch [239/250], Loss: 0.2998
Epoch [240/250], Loss: 0.2954
Epoch [241/250], Loss: 0.2977
Epoch [242/250], Loss: 0.2962
Epoch [243/250], Loss: 0.2970
Epoch [244/250], Loss: 0.3003
Epoch [245/250], Loss: 0.2921
Epoch [246/250], Loss: 0.2915
Epoch [247/250], Loss: 0.2960
Epoch [248/250], Loss: 0.2879
Epoch [249/250], Loss: 0.2858
Epoch [250/250], Loss: 0.2863
Test Accuracy: 86.42%
```

13. Hidden Layer 1, jumlah neuron 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [228/250], Loss: 0.1295
Epoch [229/250], Loss: 0.1440
Epoch [230/250], Loss: 0.1279
Epoch [231/250], Loss: 0.0859
Epoch [232/250], Loss: 0.0764
Epoch [233/250], Loss: 0.0705
Epoch [234/250], Loss: 0.0690
Epoch [235/250], Loss: 0.0753
Epoch [236/250], Loss: 0.0852
Epoch [237/250], Loss: 0.0795
Epoch [238/250], Loss: 0.0798
Epoch [239/250], Loss: 0.3093
Epoch [240/250], Loss: 0.6250
Epoch [241/250], Loss: 0.3233
Epoch [242/250], Loss: 0.1125
Epoch [243/250], Loss: 0.0840
Epoch [244/250], Loss: 0.0738
Epoch [245/250], Loss: 0.0750
Epoch [246/250], Loss: 0.0874
Epoch [247/250], Loss: 0.0725
Epoch [248/250], Loss: 0.0663
Epoch [249/250], Loss: 0.0654
Epoch [250/250], Loss: 0.0683
Test Accuracy: 95.66%
```

14. Hidden Layer 1, jumlah neuron 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [226/250], Loss: 0.3908
Epoch [227/250], Loss: 0.3952
Epoch [228/250], Loss: 0.3925
Epoch [229/250], Loss: 0.3888
Epoch [230/250], Loss: 0.3912
Epoch [231/250], Loss: 0.3914
Epoch [232/250], Loss: 0.3878
Epoch [233/250], Loss: 0.3858
Epoch [234/250], Loss: 0.3913
Epoch [235/250], Loss: 0.3826
Epoch [236/250], Loss: 0.3842
Epoch [237/250], Loss: 0.3810
Epoch [238/250], Loss: 0.3830
Epoch [239/250], Loss: 0.3811
Epoch [240/250], Loss: 0.3817
Epoch [241/250], Loss: 0.3773
Epoch [242/250], Loss: 0.3773
Epoch [243/250], Loss: 0.3811
Epoch [244/250], Loss: 0.3787
Epoch [245/250], Loss: 0.3756
Epoch [246/250], Loss: 0.3804
Epoch [247/250], Loss: 0.3776
Epoch [248/250], Loss: 0.3773
Epoch [249/250], Loss: 0.3779
Epoch [250/250], Loss: 0.3701
Test Accuracy: 80.64%
```

15. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 10 , Batch Size 512

```
Epoch [221/250], Loss: 1.1189
Epoch [222/250], Loss: 1.2367
Epoch [223/250], Loss: 1.0919
Epoch [224/250], Loss: 1.4483
Epoch [225/250], Loss: 1.1868
Epoch [226/250], Loss: 1.3905
Epoch [227/250], Loss: 0.9449
Epoch [228/250], Loss: 1.1716
Epoch [229/250], Loss: 1.3464
Epoch [230/250], Loss: 1.3200
Epoch [231/250], Loss: 1.4389
Epoch [232/250], Loss: 1.3886
Epoch [233/250], Loss: 1.0299
Epoch [234/250], Loss: 1.3218
Epoch [235/250], Loss: 1.3973
Epoch [236/250], Loss: 1.3355
Epoch [237/250], Loss: 1.2346
Epoch [238/250], Loss: 0.8620
Epoch [239/250], Loss: 1.4819
Epoch [240/250], Loss: 1.2642
Epoch [241/250], Loss: 1.1399
Epoch [242/250], Loss: 1.2307
Epoch [243/250], Loss: 1.2020
Epoch [244/250], Loss: 0.9779
Epoch [245/250], Loss: 1.3316
Epoch [246/250], Loss: 0.9132
Epoch [247/250], Loss: 1.3262
Epoch [248/250], Loss: 1.4393
Epoch [249/250], Loss: 1.1852
Epoch [250/250], Loss: 1.5980
Test Accuracy: 67.92%
```

ReLU memiliki perfoma terbaik di Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 1 , Batch Size 512 untuk kasus dataset ini, namun akan menurun jika menggunakan learning ratenya terlalu besar 10 atau terlalu kecil (0.1, 0.01, dan lain lain) namun itu tergantung dari banyaknya epoch, batchsize, dan jumlah neuron pada dataset. Pada kasus penggunaan ReLU ini terbaik di hidden layer 2 karena jumlah neuron yang cukup besar memungkinkan model dapat menangkap pola-pola kompleks.

B. Sigmoid

1. Hidden Layer 1, jumlah neuron 4 , epoch 1 , learning rate 10 , Batch Size 16

```
Epoch [1/1], Loss: 1.7060
Test Accuracy: 67.92%
```

2. Hidden Layer 2, jumlah neuron 4 8 , epoch 10 , learning rate 1 , Batch Size 32

```
Epoch [1/10], Loss: 0.8695
Epoch [2/10], Loss: 0.8626
Epoch [3/10], Loss: 0.8289
Epoch [4/10], Loss: 0.7934
Epoch [5/10], Loss: 0.7496
Epoch [6/10], Loss: 0.7258
Epoch [7/10], Loss: 0.7149
Epoch [8/10], Loss: 0.7020
Epoch [9/10], Loss: 0.6999
Epoch [10/10], Loss: 0.6876
Test Accuracy: 67.92%
```

3. Hidden Layer 3, jumlah neuron 4 8 16 , epoch 25 , learning rate 0.1 , Batch Size 64

```
Epoch [4/25], Loss: 0.8271
Epoch [5/25], Loss: 0.8297
Epoch [6/25], Loss: 0.8309
Epoch [7/25], Loss: 0.8321
Epoch [8/25], Loss: 0.8295
Epoch [9/25], Loss: 0.8310
Epoch [10/25], Loss: 0.8283
Epoch [11/25], Loss: 0.8308
Epoch [12/25], Loss: 0.8255
Epoch [13/25], Loss: 0.8258
Epoch [14/25], Loss: 0.8280
Epoch [15/25], Loss: 0.8282
Epoch [16/25], Loss: 0.8293
Epoch [17/25], Loss: 0.8269
Epoch [18/25], Loss: 0.8280
Epoch [19/25], Loss: 0.8305
Epoch [20/25], Loss: 0.8320
Epoch [21/25], Loss: 0.8323
Epoch [22/25], Loss: 0.8263
Epoch [23/25], Loss: 0.8268
Epoch [24/25], Loss: 0.8273
Epoch [25/25], Loss: 0.8266
Test Accuracy: 67.92%
```

4. Hidden Layer 1, jumlah neuron 8 , epoch 25, learning rate 0.01 , Batch Size 128

```
Epoch [4/25], Loss: 1.3111
Epoch [5/25], Loss: 1.2363
Epoch [6/25], Loss: 1.1756
Epoch [7/25], Loss: 1.1242
Epoch [8/25], Loss: 1.0819
Epoch [9/25], Loss: 1.0466
Epoch [10/25], Loss: 1.0181
Epoch [11/25], Loss: 0.9924
Epoch [12/25], Loss: 0.9736
Epoch [13/25], Loss: 0.9559
Epoch [14/25], Loss: 0.9435
Epoch [15/25], Loss: 0.9287
Epoch [16/25], Loss: 0.9208
Epoch [17/25], Loss: 0.9104
Epoch [18/25], Loss: 0.9034
Epoch [19/25], Loss: 0.8950
Epoch [20/25], Loss: 0.8887
Epoch [21/25], Loss: 0.8846
Epoch [22/25], Loss: 0.8792
Epoch [23/25], Loss: 0.8726
Epoch [24/25], Loss: 0.8707
Epoch [25/25], Loss: 0.8631
Test Accuracy: 67.92%
```

5. Hidden Layer 2, jumlah neuron 16 32, epoch 50, learning rate 0.001 , Batch Size 256

```
Epoch [33/50], Loss: 1.0269
Epoch [34/50], Loss: 1.0200
Epoch [35/50], Loss: 1.0132
Epoch [36/50], Loss: 1.0212
Epoch [37/50], Loss: 1.0120
Epoch [38/50], Loss: 1.0083
Epoch [39/50], Loss: 1.0031
Epoch [40/50], Loss: 1.0012
Epoch [41/50], Loss: 0.9950
Epoch [42/50], Loss: 0.9900
Epoch [43/50], Loss: 0.9833
Epoch [44/50], Loss: 0.9760
Epoch [45/50], Loss: 0.9800
Epoch [46/50], Loss: 0.9760
Epoch [47/50], Loss: 0.9765
Epoch [48/50], Loss: 0.9634
Epoch [49/50], Loss: 0.9657
Epoch [50/50], Loss: 0.9638
Test Accuracy: 67.92%
```

6. Hidden Layer 3, jumlah neuron 16 32 64, epoch 100, learning rate 0.0001 , Batch Size 512

```
Epoch [76/100], Loss: 1.4148
Epoch [77/100], Loss: 1.4130
Epoch [78/100], Loss: 1.4116
Epoch [79/100], Loss: 1.4100
Epoch [80/100], Loss: 1.4082
Epoch [81/100], Loss: 1.4071
Epoch [82/100], Loss: 1.4055
Epoch [83/100], Loss: 1.4040
Epoch [84/100], Loss: 1.4026
Epoch [85/100], Loss: 1.4011
Epoch [86/100], Loss: 1.3997
Epoch [87/100], Loss: 1.3983
Epoch [88/100], Loss: 1.3967
Epoch [89/100], Loss: 1.3951
Epoch [90/100], Loss: 1.3937
Epoch [91/100], Loss: 1.3922
Epoch [92/100], Loss: 1.3909
Epoch [93/100], Loss: 1.3893
Epoch [94/100], Loss: 1.3879
Epoch [95/100], Loss: 1.3862
Epoch [96/100], Loss: 1.3849
Epoch [97/100], Loss: 1.3835
Epoch [98/100], Loss: 1.3821
Epoch [99/100], Loss: 1.3806
Epoch [100/100], Loss: 1.3792
Test Accuracy: 23.99%
```

7. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 0.001 , Batch Size 512

```
Epoch [236/250], Loss: 0.8376
Epoch [237/250], Loss: 0.8449
Epoch [238/250], Loss: 0.8476
Epoch [239/250], Loss: 0.8407
Epoch [240/250], Loss: 0.8421
Epoch [241/250], Loss: 0.8434
Epoch [242/250], Loss: 0.8382
Epoch [243/250], Loss: 0.8421
Epoch [244/250], Loss: 0.8489
Epoch [245/250], Loss: 0.8461
Epoch [246/250], Loss: 0.8374
Epoch [247/250], Loss: 0.8431
Epoch [248/250], Loss: 0.8412
Epoch [249/250], Loss: 0.8414
Epoch [250/250], Loss: 0.8397
Test Accuracy: 67.92%
```

8. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [236/250], Loss: 0.6830
Epoch [237/250], Loss: 0.6733
Epoch [238/250], Loss: 0.6763
Epoch [239/250], Loss: 0.6835
Epoch [240/250], Loss: 0.6832
Epoch [241/250], Loss: 0.6804
Epoch [242/250], Loss: 0.6795
Epoch [243/250], Loss: 0.6767
Epoch [244/250], Loss: 0.6727
Epoch [245/250], Loss: 0.6761
Epoch [246/250], Loss: 0.6728
Epoch [247/250], Loss: 0.6773
Epoch [248/250], Loss: 0.6774
Epoch [249/250], Loss: 0.6742
Epoch [250/250], Loss: 0.6695
Test Accuracy: 67.92%
```

9. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [236/250], Loss: 0.8321
Epoch [237/250], Loss: 0.8258
Epoch [238/250], Loss: 0.8264
Epoch [239/250], Loss: 0.8309
Epoch [240/250], Loss: 0.8264
Epoch [241/250], Loss: 0.8216
Epoch [242/250], Loss: 0.8302
Epoch [243/250], Loss: 0.8263
Epoch [244/250], Loss: 0.8281
Epoch [245/250], Loss: 0.8300
Epoch [246/250], Loss: 0.8202
Epoch [247/250], Loss: 0.8258
Epoch [248/250], Loss: 0.8320
Epoch [249/250], Loss: 0.8211
Epoch [250/250], Loss: 0.8211
Test Accuracy: 67.92%
```

10. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [226/250], Loss: 0.7971
Epoch [227/250], Loss: 0.8021
Epoch [228/250], Loss: 0.7992
Epoch [229/250], Loss: 0.7939
Epoch [230/250], Loss: 0.7916
Epoch [231/250], Loss: 0.7937
Epoch [232/250], Loss: 0.7946
Epoch [233/250], Loss: 0.7848
Epoch [234/250], Loss: 0.7925
Epoch [235/250], Loss: 0.7920
Epoch [236/250], Loss: 0.7866
Epoch [237/250], Loss: 0.7851
Epoch [238/250], Loss: 0.7973
Epoch [239/250], Loss: 0.7942
Epoch [240/250], Loss: 0.7882
Epoch [241/250], Loss: 0.7954
Epoch [242/250], Loss: 0.7932
Epoch [243/250], Loss: 0.7967
Epoch [244/250], Loss: 0.7850
Epoch [245/250], Loss: 0.7872
Epoch [246/250], Loss: 0.7893
Epoch [247/250], Loss: 0.7867
Epoch [248/250], Loss: 0.7916
Epoch [249/250], Loss: 0.7778
Epoch [250/250], Loss: 0.7890
Test Accuracy: 67.92%
```

11. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [236/250], Loss: 0.6151
Epoch [237/250], Loss: 0.6040
Epoch [238/250], Loss: 0.5866
Epoch [239/250], Loss: 0.5843
Epoch [240/250], Loss: 0.5926
Epoch [241/250], Loss: 0.5775
Epoch [242/250], Loss: 0.6044
Epoch [243/250], Loss: 0.6550
Epoch [244/250], Loss: 0.6337
Epoch [245/250], Loss: 0.5987
Epoch [246/250], Loss: 0.5933
Epoch [247/250], Loss: 0.6034
Epoch [248/250], Loss: 0.5935
Epoch [249/250], Loss: 0.5957
Epoch [250/250], Loss: 0.6196
Test Accuracy: 69.65%
```

12. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [226/250], Loss: 0.7756
Epoch [227/250], Loss: 0.7754
Epoch [228/250], Loss: 0.7679
Epoch [229/250], Loss: 0.7713
Epoch [230/250], Loss: 0.7739
Epoch [231/250], Loss: 0.7719
Epoch [232/250], Loss: 0.7767
Epoch [233/250], Loss: 0.7711
Epoch [234/250], Loss: 0.7653
Epoch [235/250], Loss: 0.7673
Epoch [236/250], Loss: 0.7645
Epoch [237/250], Loss: 0.7671
Epoch [238/250], Loss: 0.7645
Epoch [239/250], Loss: 0.7611
Epoch [240/250], Loss: 0.7741
Epoch [241/250], Loss: 0.7696
Epoch [242/250], Loss: 0.7722
Epoch [243/250], Loss: 0.7607
Epoch [244/250], Loss: 0.7672
Epoch [245/250], Loss: 0.7638
Epoch [246/250], Loss: 0.7579
Epoch [247/250], Loss: 0.7671
Epoch [248/250], Loss: 0.7655
Epoch [249/250], Loss: 0.7633
Epoch [250/250], Loss: 0.7559
Test Accuracy: 67.92%
```

13. Hidden Layer 1, jumlah neuron 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [226/250], Loss: 0.3315
Epoch [227/250], Loss: 0.3287
Epoch [228/250], Loss: 0.3278
Epoch [229/250], Loss: 0.3279
Epoch [230/250], Loss: 0.3268
Epoch [231/250], Loss: 0.3293
Epoch [232/250], Loss: 0.3310
Epoch [233/250], Loss: 0.3231
Epoch [234/250], Loss: 0.3235
Epoch [235/250], Loss: 0.3559
Epoch [236/250], Loss: 0.3386
Epoch [237/250], Loss: 0.3414
Epoch [238/250], Loss: 0.3246
Epoch [239/250], Loss: 0.3233
Epoch [240/250], Loss: 0.3183
Epoch [241/250], Loss: 0.3164
Epoch [242/250], Loss: 0.3181
Epoch [243/250], Loss: 0.3151
Epoch [244/250], Loss: 0.3146
Epoch [245/250], Loss: 0.3093
Epoch [246/250], Loss: 0.3100
Epoch [247/250], Loss: 0.3167
Epoch [248/250], Loss: 0.3304
Epoch [249/250], Loss: 0.3177
Epoch [250/250], Loss: 0.3109
Test Accuracy: 87.57%
```

14. Hidden Layer 1, jumlah neuron 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [236/250], Loss: 0.6938
Epoch [237/250], Loss: 0.6964
Epoch [238/250], Loss: 0.6909
Epoch [239/250], Loss: 0.6892
Epoch [240/250], Loss: 0.6988
Epoch [241/250], Loss: 0.6870
Epoch [242/250], Loss: 0.6946
Epoch [243/250], Loss: 0.6879
Epoch [244/250], Loss: 0.6962
Epoch [245/250], Loss: 0.6903
Epoch [246/250], Loss: 0.6904
Epoch [247/250], Loss: 0.6960
Epoch [248/250], Loss: 0.6953
Epoch [249/250], Loss: 0.6972
Epoch [250/250], Loss: 0.6920
Test Accuracy: 67.92%
```

15. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 10 , Batch Size 512

```
Epoch [226/250], Loss: 1.1905
Epoch [227/250], Loss: 0.8587
Epoch [228/250], Loss: 1.1827
Epoch [229/250], Loss: 0.8509
Epoch [230/250], Loss: 1.4228
Epoch [231/250], Loss: 1.3753
Epoch [232/250], Loss: 1.0274
Epoch [233/250], Loss: 1.1460
Epoch [234/250], Loss: 1.1834
Epoch [235/250], Loss: 1.0207
Epoch [236/250], Loss: 1.5698
Epoch [237/250], Loss: 1.2215
Epoch [238/250], Loss: 1.0889
Epoch [239/250], Loss: 1.5215
Epoch [240/250], Loss: 1.3427
Epoch [241/250], Loss: 1.3217
Epoch [242/250], Loss: 0.9168
Epoch [243/250], Loss: 1.1093
Epoch [244/250], Loss: 0.8767
Epoch [245/250], Loss: 1.3916
Epoch [246/250], Loss: 1.1080
Epoch [247/250], Loss: 1.4761
Epoch [248/250], Loss: 1.1446
Epoch [249/250], Loss: 1.3669
Epoch [250/250], Loss: 0.9245
Test Accuracy: 67.92%
```

Pada kasus jika menggunakan Sigmoid kebanyakan pada setiap settingan hyperparamter tuningnya memperoleh akurasi sekitar 65-67% karena sigmoid menggunakan fungsi mengubah input nilai antara 0 dan 1 (biner) yang menyebabkan terbatas pada output yang membuat trainingnya menjadi lebih sulit.

C. Tanh

1. Hidden Layer 1, jumlah neuron 4 , epoch 1 , learning rate 10 , Batch Size 16

```
Epoch [1/1], Loss: 10.8711
Test Accuracy: 3.18%
```

2. Hidden Layer 2, jumlah neuron 4 8 , epoch 10 , learning rate 1 , Batch Size 32

```
Epoch [1/10], Loss: 0.8545
Epoch [2/10], Loss: 0.7472
Epoch [3/10], Loss: 0.6606
Epoch [4/10], Loss: 0.6073
Epoch [5/10], Loss: 0.5612
Epoch [6/10], Loss: 0.5628
Epoch [7/10], Loss: 0.5403
Epoch [8/10], Loss: 0.5074
Epoch [9/10], Loss: 0.5114
Epoch [10/10], Loss: 0.5130
Test Accuracy: 73.41%
```

3. Hidden Layer 3, jumlah neuron 4 8 16 , epoch 25 , learning rate 0.1 , Batch Size 64

```
Epoch [14/25], Loss: 0.7385
Epoch [15/25], Loss: 0.7241
Epoch [16/25], Loss: 0.7138
Epoch [17/25], Loss: 0.7063
Epoch [18/25], Loss: 0.7011
Epoch [19/25], Loss: 0.6977
Epoch [20/25], Loss: 0.6960
Epoch [21/25], Loss: 0.6890
Epoch [22/25], Loss: 0.6894
Epoch [23/25], Loss: 0.6834
Epoch [24/25], Loss: 0.6748
Epoch [25/25], Loss: 0.6710
Test Accuracy: 67.05%
```

4. Hidden Layer 1, jumlah neuron 8 , epoch 25, learning rate 0.01 , Batch Size 128

```
Epoch [6/25], Loss: 1.0426
Epoch [7/25], Loss: 1.0030
Epoch [8/25], Loss: 0.9759
Epoch [9/25], Loss: 0.9527
Epoch [10/25], Loss: 0.9324
Epoch [11/25], Loss: 0.9170
Epoch [12/25], Loss: 0.9035
Epoch [13/25], Loss: 0.8942
Epoch [14/25], Loss: 0.8854
Epoch [15/25], Loss: 0.8736
Epoch [16/25], Loss: 0.8688
Epoch [17/25], Loss: 0.8608
Epoch [18/25], Loss: 0.8568
Epoch [19/25], Loss: 0.8528
Epoch [20/25], Loss: 0.8482
Epoch [21/25], Loss: 0.8455
Epoch [22/25], Loss: 0.8373
Epoch [23/25], Loss: 0.8321
Epoch [24/25], Loss: 0.8304
Epoch [25/25], Loss: 0.8271
Test Accuracy: 67.92%
```

5. Hidden Layer 2, jumlah neuron 16 32, epoch 50, learning rate 0.001 , Batch Size 256

```
Epoch [35/50], Loss: 1.2480
Epoch [36/50], Loss: 1.2424
Epoch [37/50], Loss: 1.2393
Epoch [38/50], Loss: 1.2300
Epoch [39/50], Loss: 1.2287
Epoch [40/50], Loss: 1.2178
Epoch [41/50], Loss: 1.2141
Epoch [42/50], Loss: 1.2102
Epoch [43/50], Loss: 1.2041
Epoch [44/50], Loss: 1.2023
Epoch [45/50], Loss: 1.1947
Epoch [46/50], Loss: 1.1921
Epoch [47/50], Loss: 1.1864
Epoch [48/50], Loss: 1.1817
Epoch [49/50], Loss: 1.1768
Epoch [50/50], Loss: 1.1734
Test Accuracy: 67.92%
```

6. Hidden Layer 3, jumlah neuron 16 32 64, epoch 100, learning rate 0.0001 , Batch Size 512

```
Epoch [78/100], Loss: 1.3950
Epoch [79/100], Loss: 1.3949
Epoch [80/100], Loss: 1.3943
Epoch [81/100], Loss: 1.3933
Epoch [82/100], Loss: 1.3934
Epoch [83/100], Loss: 1.3927
Epoch [84/100], Loss: 1.3920
Epoch [85/100], Loss: 1.3914
Epoch [86/100], Loss: 1.3911
Epoch [87/100], Loss: 1.3905
Epoch [88/100], Loss: 1.3905
Epoch [89/100], Loss: 1.3898
Epoch [90/100], Loss: 1.3890
Epoch [91/100], Loss: 1.3888
Epoch [92/100], Loss: 1.3882
Epoch [93/100], Loss: 1.3875
Epoch [94/100], Loss: 1.3873
Epoch [95/100], Loss: 1.3866
Epoch [96/100], Loss: 1.3856
Epoch [97/100], Loss: 1.3856
Epoch [98/100], Loss: 1.3850
Epoch [99/100], Loss: 1.3846
Epoch [100/100], Loss: 1.3844
Test Accuracy: 26.30%
```

7. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 0.001 , Batch Size 512

```
Epoch [235/250], Loss: 0.7282
Epoch [236/250], Loss: 0.7342
Epoch [237/250], Loss: 0.7324
Epoch [238/250], Loss: 0.7313
Epoch [239/250], Loss: 0.7335
Epoch [240/250], Loss: 0.7341
Epoch [241/250], Loss: 0.7325
Epoch [242/250], Loss: 0.7242
Epoch [243/250], Loss: 0.7253
Epoch [244/250], Loss: 0.7295
Epoch [245/250], Loss: 0.7313
Epoch [246/250], Loss: 0.7309
Epoch [247/250], Loss: 0.7303
Epoch [248/250], Loss: 0.7236
Epoch [249/250], Loss: 0.7245
Epoch [250/250], Loss: 0.7257
Test Accuracy: 68.50%
```

8. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [235/250], Loss: 0.2594
Epoch [236/250], Loss: 0.1117
Epoch [237/250], Loss: 0.0678
Epoch [238/250], Loss: 0.0668
Epoch [239/250], Loss: 0.0879
Epoch [240/250], Loss: 0.1428
Epoch [241/250], Loss: 0.0660
Epoch [242/250], Loss: 0.0495
Epoch [243/250], Loss: 0.0464
Epoch [244/250], Loss: 0.0529
Epoch [245/250], Loss: 0.0497
Epoch [246/250], Loss: 0.0713
Epoch [247/250], Loss: 0.0410
Epoch [248/250], Loss: 0.0374
Epoch [249/250], Loss: 0.0682
Epoch [250/250], Loss: 0.3139
Test Accuracy: 88.44%
```

9. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [225/250], Loss: 0.3364
Epoch [226/250], Loss: 0.3761
Epoch [227/250], Loss: 0.3799
Epoch [228/250], Loss: 0.4323
Epoch [229/250], Loss: 0.5180
Epoch [230/250], Loss: 0.4184
Epoch [231/250], Loss: 0.3915
Epoch [232/250], Loss: 0.4102
Epoch [233/250], Loss: 0.4148
Epoch [234/250], Loss: 0.3466
Epoch [235/250], Loss: 0.3319
Epoch [236/250], Loss: 0.3275
Epoch [237/250], Loss: 0.3331
Epoch [238/250], Loss: 0.3226
Epoch [239/250], Loss: 0.3215
Epoch [240/250], Loss: 0.3322
Epoch [241/250], Loss: 0.3841
Epoch [242/250], Loss: 0.4348
Epoch [243/250], Loss: 0.3540
Epoch [244/250], Loss: 0.3258
Epoch [245/250], Loss: 0.3446
Epoch [246/250], Loss: 0.3968
Epoch [247/250], Loss: 0.3400
Epoch [248/250], Loss: 0.3153
Epoch [249/250], Loss: 0.3571
Epoch [250/250], Loss: 0.4549
Test Accuracy: 76.88%
```

10. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [243/250], Loss: 0.3838
Epoch [244/250], Loss: 0.4097
Epoch [245/250], Loss: 0.4018
Epoch [246/250], Loss: 0.3924
Epoch [247/250], Loss: 0.3634
Epoch [248/250], Loss: 0.3832
Epoch [249/250], Loss: 0.3802
Epoch [250/250], Loss: 0.4091
Test Accuracy: 84.97%
```

11. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [233/250], Loss: 0.0253
Epoch [234/250], Loss: 0.0250
Epoch [235/250], Loss: 0.0272
Epoch [236/250], Loss: 0.0240
Epoch [237/250], Loss: 0.0260
Epoch [238/250], Loss: 0.0275
Epoch [239/250], Loss: 0.0251
Epoch [240/250], Loss: 0.0285
Epoch [241/250], Loss: 0.0231
Epoch [242/250], Loss: 0.0242
Epoch [243/250], Loss: 0.0234
Epoch [244/250], Loss: 0.0232
Epoch [245/250], Loss: 0.0229
Epoch [246/250], Loss: 0.0213
Epoch [247/250], Loss: 0.0206
Epoch [248/250], Loss: 0.0204
Epoch [249/250], Loss: 0.0199
Epoch [250/250], Loss: 0.0207
Test Accuracy: 97.98%
```

12. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [233/250], Loss: 0.3759
Epoch [234/250], Loss: 0.3749
Epoch [235/250], Loss: 0.3749
Epoch [236/250], Loss: 0.4007
Epoch [237/250], Loss: 0.3961
Epoch [238/250], Loss: 0.3769
Epoch [239/250], Loss: 0.3909
Epoch [240/250], Loss: 0.4068
Epoch [241/250], Loss: 0.3847
Epoch [242/250], Loss: 0.3877
Epoch [243/250], Loss: 0.4159
Epoch [244/250], Loss: 0.3945
Epoch [245/250], Loss: 0.3968
Epoch [246/250], Loss: 0.3941
Epoch [247/250], Loss: 0.3610
Epoch [248/250], Loss: 0.3604
Epoch [249/250], Loss: 0.3654
Epoch [250/250], Loss: 0.3569
Test Accuracy: 83.82%
```

13. Hidden Layer 1, jumlah neuron 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [233/250], Loss: 0.1086
Epoch [234/250], Loss: 0.1064
Epoch [235/250], Loss: 0.1037
Epoch [236/250], Loss: 0.1057
Epoch [237/250], Loss: 0.1000
Epoch [238/250], Loss: 0.1027
Epoch [239/250], Loss: 0.0975
Epoch [240/250], Loss: 0.1010
Epoch [241/250], Loss: 0.1003
Epoch [242/250], Loss: 0.0987
Epoch [243/250], Loss: 0.1040
Epoch [244/250], Loss: 0.1223
Epoch [245/250], Loss: 0.1105
Epoch [246/250], Loss: 0.0991
Epoch [247/250], Loss: 0.0985
Epoch [248/250], Loss: 0.0953
Epoch [249/250], Loss: 0.0950
Epoch [250/250], Loss: 0.0931
Test Accuracy: 93.93%
```

14. Hidden Layer 1, jumlah neuron 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [233/250], Loss: 0.4731
Epoch [234/250], Loss: 0.4695
Epoch [235/250], Loss: 0.4673
Epoch [236/250], Loss: 0.4676
Epoch [237/250], Loss: 0.4654
Epoch [238/250], Loss: 0.4699
Epoch [239/250], Loss: 0.4685
Epoch [240/250], Loss: 0.4629
Epoch [241/250], Loss: 0.4646
Epoch [242/250], Loss: 0.4638
Epoch [243/250], Loss: 0.4606
Epoch [244/250], Loss: 0.4585
Epoch [245/250], Loss: 0.4573
Epoch [246/250], Loss: 0.4583
Epoch [247/250], Loss: 0.4574
Epoch [248/250], Loss: 0.4581
Epoch [249/250], Loss: 0.4569
Epoch [250/250], Loss: 0.4523
Test Accuracy: 76.30%
```

15. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 10 , Batch Size 512

```
Epoch [233/250], Loss: 170.1655
Epoch [234/250], Loss: 130.7693
Epoch [235/250], Loss: 97.2404
Epoch [236/250], Loss: 141.7471
Epoch [237/250], Loss: 123.0281
Epoch [238/250], Loss: 157.0187
Epoch [239/250], Loss: 159.8304
Epoch [240/250], Loss: 138.6500
Epoch [241/250], Loss: 195.7990
Epoch [242/250], Loss: 146.5871
Epoch [243/250], Loss: 123.6836
Epoch [244/250], Loss: 106.5711
Epoch [245/250], Loss: 150.5780
Epoch [246/250], Loss: 118.2906
Epoch [247/250], Loss: 178.2782
Epoch [248/250], Loss: 85.7219
Epoch [249/250], Loss: 198.5366
Epoch [250/250], Loss: 186.4116
Test Accuracy: 67.92%
```

Untuk kasus penggunaan Tanh pada dataset ini memiliki perfoma terbaik di Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 1 , Batch Size 512, namun akan turun perfoma jika menggunakan terlalu banyak hidden layer atau learning ratenya kecil karena outputnya berada di rentang antara -1 dan 1.

D. Linear

1. Hidden Layer 1, jumlah neuron 4 , epoch 1 , learning rate 10 , Batch Size 16

```
Epoch [1/1], Loss: nan
Test Accuracy: 23.99%
```

2. Hidden Layer 2, jumlah neuron 4 8 , epoch 10 , learning rate 1 , Batch Size 32

```
Epoch [1/10], Loss: nan
Epoch [2/10], Loss: nan
Epoch [3/10], Loss: nan
Epoch [4/10], Loss: nan
Epoch [5/10], Loss: nan
Epoch [6/10], Loss: nan
Epoch [7/10], Loss: nan
Epoch [8/10], Loss: nan
Epoch [9/10], Loss: nan
Epoch [10/10], Loss: nan
Test Accuracy: 23.99%
```

3. Hidden Layer 3, jumlah neuron 4 8 16 , epoch 25 , learning rate 0.1 , Batch Size 64

```
Epoch [4/25], Loss: 0.7980
Epoch [5/25], Loss: 0.7820
Epoch [6/25], Loss: 0.7547
Epoch [7/25], Loss: 0.7268
Epoch [8/25], Loss: 0.7170
Epoch [9/25], Loss: 0.7054
Epoch [10/25], Loss: 0.6977
Epoch [11/25], Loss: 0.6940
Epoch [12/25], Loss: 0.6945
Epoch [13/25], Loss: 0.6867
Epoch [14/25], Loss: 0.6909
Epoch [15/25], Loss: 0.6991
Epoch [16/25], Loss: 0.6852
Epoch [17/25], Loss: 0.6836
Epoch [18/25], Loss: 0.6852
Epoch [19/25], Loss: 0.6918
Epoch [20/25], Loss: 0.6817
Epoch [21/25], Loss: 0.6867
Epoch [22/25], Loss: 0.6825
Epoch [23/25], Loss: 0.6774
Epoch [24/25], Loss: 0.6839
Epoch [25/25], Loss: 0.6805
Test Accuracy: 65.90%
```

4. Hidden Layer 1, jumlah neuron 8 , epoch 25, learning rate 0.01 , Batch Size 128

```
Epoch [9/25], Loss: 0.8646
Epoch [10/25], Loss: 0.8560
Epoch [11/25], Loss: 0.8477
Epoch [12/25], Loss: 0.8423
Epoch [13/25], Loss: 0.8370
Epoch [14/25], Loss: 0.8336
Epoch [15/25], Loss: 0.8270
Epoch [16/25], Loss: 0.8216
Epoch [17/25], Loss: 0.8191
Epoch [18/25], Loss: 0.8184
Epoch [19/25], Loss: 0.8129
Epoch [20/25], Loss: 0.8086
Epoch [21/25], Loss: 0.8072
Epoch [22/25], Loss: 0.8029
Epoch [23/25], Loss: 0.8024
Epoch [24/25], Loss: 0.7962
Epoch [25/25], Loss: 0.7924
Test Accuracy: 68.21%
```

5. Hidden Layer 2, jumlah neuron 16 32, epoch 50, learning rate 0.001 , Batch Size 256

```
Epoch [38/50], Loss: 0.9703
Epoch [39/50], Loss: 0.9630
Epoch [40/50], Loss: 0.9530
Epoch [41/50], Loss: 0.9556
Epoch [42/50], Loss: 0.9474
Epoch [43/50], Loss: 0.9491
Epoch [44/50], Loss: 0.9485
Epoch [45/50], Loss: 0.9360
Epoch [46/50], Loss: 0.9309
Epoch [47/50], Loss: 0.9400
Epoch [48/50], Loss: 0.9284
Epoch [49/50], Loss: 0.9259
Epoch [50/50], Loss: 0.9222
Test Accuracy: 67.92%
```

6. Hidden Layer 3, jumlah neuron 16 32 64, epoch 100, learning rate 0.0001 , Batch Size 512

```
Epoch [82/100], Loss: 1.2609
Epoch [83/100], Loss: 1.2589
Epoch [84/100], Loss: 1.2583
Epoch [85/100], Loss: 1.2585
Epoch [86/100], Loss: 1.2575
Epoch [87/100], Loss: 1.2569
Epoch [88/100], Loss: 1.2561
Epoch [89/100], Loss: 1.2549
Epoch [90/100], Loss: 1.2550
Epoch [91/100], Loss: 1.2536
Epoch [92/100], Loss: 1.2528
Epoch [93/100], Loss: 1.2519
Epoch [94/100], Loss: 1.2518
Epoch [95/100], Loss: 1.2514
Epoch [96/100], Loss: 1.2504
Epoch [97/100], Loss: 1.2489
Epoch [98/100], Loss: 1.2481
Epoch [99/100], Loss: 1.2483
Epoch [100/100], Loss: 1.2475
Test Accuracy: 63.01%
```

7. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 0.001 , Batch Size 512

```
Epoch [232/250], Loss: 0.8567
Epoch [233/250], Loss: 0.8605
Epoch [234/250], Loss: 0.8599
Epoch [235/250], Loss: 0.8586
Epoch [236/250], Loss: 0.8554
Epoch [237/250], Loss: 0.8588
Epoch [238/250], Loss: 0.8553
Epoch [239/250], Loss: 0.8578
Epoch [240/250], Loss: 0.8549
Epoch [241/250], Loss: 0.8564
Epoch [242/250], Loss: 0.8558
Epoch [243/250], Loss: 0.8567
Epoch [244/250], Loss: 0.8565
Epoch [245/250], Loss: 0.8531
Epoch [246/250], Loss: 0.8540
Epoch [247/250], Loss: 0.8523
Epoch [248/250], Loss: 0.8597
Epoch [249/250], Loss: 0.8550
Epoch [250/250], Loss: 0.8526
Test Accuracy: 67.92%
```

8. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [232/250], Loss: nan
Epoch [233/250], Loss: nan
Epoch [234/250], Loss: nan
Epoch [235/250], Loss: nan
Epoch [236/250], Loss: nan
Epoch [237/250], Loss: nan
Epoch [238/250], Loss: nan
Epoch [239/250], Loss: nan
Epoch [240/250], Loss: nan
Epoch [241/250], Loss: nan
Epoch [242/250], Loss: nan
Epoch [243/250], Loss: nan
Epoch [244/250], Loss: nan
Epoch [245/250], Loss: nan
Epoch [246/250], Loss: nan
Epoch [247/250], Loss: nan
Epoch [248/250], Loss: nan
Epoch [249/250], Loss: nan
Epoch [250/250], Loss: nan
Test Accuracy: 23.99%
```

9. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [232/250], Loss: 0.6720
Epoch [233/250], Loss: 0.6777
Epoch [234/250], Loss: 0.6720
Epoch [235/250], Loss: 0.6826
Epoch [236/250], Loss: 0.6752
Epoch [237/250], Loss: 0.6777
Epoch [238/250], Loss: 0.6784
Epoch [239/250], Loss: 0.6758
Epoch [240/250], Loss: 0.6753
Epoch [241/250], Loss: 0.6753
Epoch [242/250], Loss: 0.6713
Epoch [243/250], Loss: 0.6727
Epoch [244/250], Loss: 0.6741
Epoch [245/250], Loss: 0.6738
Epoch [246/250], Loss: 0.6683
Epoch [247/250], Loss: 0.6729
Epoch [248/250], Loss: 0.6745
Epoch [249/250], Loss: 0.6720
Epoch [250/250], Loss: 0.6753
Test Accuracy: 65.61%
```

10. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [232/250], Loss: 0.6764
Epoch [233/250], Loss: 0.6713
Epoch [234/250], Loss: 0.6726
Epoch [235/250], Loss: 0.6800
Epoch [236/250], Loss: 0.6737
Epoch [237/250], Loss: 0.6758
Epoch [238/250], Loss: 0.6837
Epoch [239/250], Loss: 0.6752
Epoch [240/250], Loss: 0.6808
Epoch [241/250], Loss: 0.6751
Epoch [242/250], Loss: 0.6710
Epoch [243/250], Loss: 0.6726
Epoch [244/250], Loss: 0.6651
Epoch [245/250], Loss: 0.6718
Epoch [246/250], Loss: 0.6721
Epoch [247/250], Loss: 0.6751
Epoch [248/250], Loss: 0.6701
Epoch [249/250], Loss: 0.6729
Epoch [250/250], Loss: 0.6703
Test Accuracy: 66.47%
```

11. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [240/250], Loss: nan
Epoch [241/250], Loss: nan
Epoch [242/250], Loss: nan
Epoch [243/250], Loss: nan
Epoch [244/250], Loss: nan
Epoch [245/250], Loss: nan
Epoch [246/250], Loss: nan
Epoch [247/250], Loss: nan
Epoch [248/250], Loss: nan
Epoch [249/250], Loss: nan
Epoch [250/250], Loss: nan
Test Accuracy: 23.99%
```

12. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [242/250], Loss: 0.6780
Epoch [243/250], Loss: 0.6765
Epoch [244/250], Loss: 0.6759
Epoch [245/250], Loss: 0.6811
Epoch [246/250], Loss: 0.6688
Epoch [247/250], Loss: 0.6684
Epoch [248/250], Loss: 0.6759
Epoch [249/250], Loss: 0.6747
Epoch [250/250], Loss: 0.6752
Test Accuracy: 65.61%
```

13. Hidden Layer 1, jumlah neuron 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [241/250], Loss: nan
Epoch [242/250], Loss: nan
Epoch [243/250], Loss: nan
Epoch [244/250], Loss: nan
Epoch [245/250], Loss: nan
Epoch [246/250], Loss: nan
Epoch [247/250], Loss: nan
Epoch [248/250], Loss: nan
Epoch [249/250], Loss: nan
Epoch [250/250], Loss: nan
Test Accuracy: 23.99%
```

14. Hidden Layer 1, jumlah neuron 64, epoch 250, learning rate 0.1 , Batch Size 51

```
Epoch [238/250], Loss: 0.6695
Epoch [239/250], Loss: 0.6703
Epoch [240/250], Loss: 0.6769
Epoch [241/250], Loss: 0.6745
Epoch [242/250], Loss: 0.6820
Epoch [243/250], Loss: 0.6834
Epoch [244/250], Loss: 0.6671
Epoch [245/250], Loss: 0.6698
Epoch [246/250], Loss: 0.6740
Epoch [247/250], Loss: 0.6801
Epoch [248/250], Loss: 0.6768
Epoch [249/250], Loss: 0.6705
Epoch [250/250], Loss: 0.6767
Test Accuracy: 65.90%
```

15. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 10 , Batch Size 512

```
Epoch [242/250], Loss: nan
Epoch [243/250], Loss: nan
Epoch [244/250], Loss: nan
Epoch [245/250], Loss: nan
Epoch [246/250], Loss: nan
Epoch [247/250], Loss: nan
Epoch [248/250], Loss: nan
Epoch [249/250], Loss: nan
Epoch [250/250], Loss: nan
Test Accuracy: 23.99%
```

Pada dikasus menggunakan linear di kasus dataset ini sangat buruk perfomanya sampai kebanyakan hasil loss nya itu NaN jika di learning ratenya terlalu tinggi (1 atau 10) karena bisa dari factor loss function tidak tepat untuk aktivasi linear dan tidak dapat menangai non-linearitas dalam data.

E. Softmax

1. Hidden Layer 1, jumlah neuron 4 , epoch 1 , learning rate 10 , Batch Size 16

```
Epoch [1/1], Loss: 1.0415
Test Accuracy: 67.92%
```

2. Hidden Layer 2, jumlah neuron 4 8 , epoch 10 , learning rate 1 , Batch Size 32

```
Epoch [1/10], Loss: 1.0607
Epoch [2/10], Loss: 1.0332
Epoch [3/10], Loss: 1.0422
Epoch [4/10], Loss: 1.0390
Epoch [5/10], Loss: 1.0421
Epoch [6/10], Loss: 1.0420
Epoch [7/10], Loss: 1.0420
Epoch [8/10], Loss: 1.0389
Epoch [9/10], Loss: 1.0389
Epoch [10/10], Loss: 1.0358
Test Accuracy: 67.92%
```

3. Hidden Layer 3, jumlah neuron 4 8 16 , epoch 25 , learning rate 0.1 , Batch Size 64

```
Epoch [13/25], Loss: 1.0408
Epoch [14/25], Loss: 1.0368
Epoch [15/25], Loss: 1.0391
Epoch [16/25], Loss: 1.0386
Epoch [17/25], Loss: 1.0386
Epoch [18/25], Loss: 1.0399
Epoch [19/25], Loss: 1.0389
Epoch [20/25], Loss: 1.0389
Epoch [21/25], Loss: 1.0398
Epoch [22/25], Loss: 1.0364
Epoch [23/25], Loss: 1.0383
Epoch [24/25], Loss: 1.0383
Epoch [25/25], Loss: 1.0383
Test Accuracy: 67.92%
```

4. Hidden Layer 1, jumlah neuron 8 , epoch 25, learning rate 0.01 , Batch Size 128

```
Epoch [10/25], Loss: 1.2452
Epoch [11/25], Loss: 1.2273
Epoch [12/25], Loss: 1.2102
Epoch [13/25], Loss: 1.1934
Epoch [14/25], Loss: 1.1784
Epoch [15/25], Loss: 1.1648
Epoch [16/25], Loss: 1.1535
Epoch [17/25], Loss: 1.1428
Epoch [18/25], Loss: 1.1348
Epoch [19/25], Loss: 1.1274
Epoch [20/25], Loss: 1.1188
Epoch [21/25], Loss: 1.1134
Epoch [22/25], Loss: 1.1072
Epoch [23/25], Loss: 1.1010
Epoch [24/25], Loss: 1.0990
Epoch [25/25], Loss: 1.0951
Test Accuracy: 67.92%
```

5. Hidden Layer 2, jumlah neuron 16 32, epoch 50, learning rate 0.001 , Batch Size 256

```
Epoch [39/50], Loss: 1.3682
Epoch [40/50], Loss: 1.3676
Epoch [41/50], Loss: 1.3675
Epoch [42/50], Loss: 1.3664
Epoch [43/50], Loss: 1.3652
Epoch [44/50], Loss: 1.3660
Epoch [45/50], Loss: 1.3641
Epoch [46/50], Loss: 1.3638
Epoch [47/50], Loss: 1.3638
Epoch [48/50], Loss: 1.3642
Epoch [49/50], Loss: 1.3626
Epoch [50/50], Loss: 1.3611
Test Accuracy: 62.14%
```

6. Hidden Layer 3, jumlah neuron 16 32 64, epoch 100, learning rate 0.0001 , Batch Size 512

```
Epoch [85/100], Loss: 1.4007
Epoch [86/100], Loss: 1.4008
Epoch [87/100], Loss: 1.4007
Epoch [88/100], Loss: 1.4008
Epoch [89/100], Loss: 1.4006
Epoch [90/100], Loss: 1.4007
Epoch [91/100], Loss: 1.4006
Epoch [92/100], Loss: 1.4006
Epoch [93/100], Loss: 1.4006
Epoch [94/100], Loss: 1.4006
Epoch [95/100], Loss: 1.4006
Epoch [96/100], Loss: 1.4004
Epoch [97/100], Loss: 1.4005
Epoch [98/100], Loss: 1.4006
Epoch [99/100], Loss: 1.4004
Epoch [100/100], Loss: 1.4005
Test Accuracy: 3.18%
```

7. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 0.001 , Batch Size 512

```
Epoch [241/250], Loss: 1.3179
Epoch [242/250], Loss: 1.3179
Epoch [243/250], Loss: 1.3173
Epoch [244/250], Loss: 1.3177
Epoch [245/250], Loss: 1.3167
Epoch [246/250], Loss: 1.3170
Epoch [247/250], Loss: 1.3163
Epoch [248/250], Loss: 1.3160
Epoch [249/250], Loss: 1.3154
Epoch [250/250], Loss: 1.3156
Test Accuracy: 67.92%
```

8. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [238/250], Loss: 1.0260
Epoch [239/250], Loss: 1.0295
Epoch [240/250], Loss: 1.0278
Epoch [241/250], Loss: 1.0274
Epoch [242/250], Loss: 1.0243
Epoch [243/250], Loss: 1.0258
Epoch [244/250], Loss: 1.0254
Epoch [245/250], Loss: 1.0232
Epoch [246/250], Loss: 1.0261
Epoch [247/250], Loss: 1.0220
Epoch [248/250], Loss: 1.0200
Epoch [249/250], Loss: 1.0207
Epoch [250/250], Loss: 1.0230
Test Accuracy: 68.21%
```

9. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [238/250], Loss: 1.0360
Epoch [239/250], Loss: 1.0383
Epoch [240/250], Loss: 1.0408
Epoch [241/250], Loss: 1.0385
Epoch [242/250], Loss: 1.0388
Epoch [243/250], Loss: 1.0385
Epoch [244/250], Loss: 1.0411
Epoch [245/250], Loss: 1.0369
Epoch [246/250], Loss: 1.0377
Epoch [247/250], Loss: 1.0363
Epoch [248/250], Loss: 1.0413
Epoch [249/250], Loss: 1.0383
Epoch [250/250], Loss: 1.0419
Test Accuracy: 67.92%
```

10. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [238/250], Loss: 1.0385
Epoch [239/250], Loss: 1.0391
Epoch [240/250], Loss: 1.0365
Epoch [241/250], Loss: 1.0410
Epoch [242/250], Loss: 1.0385
Epoch [243/250], Loss: 1.0351
Epoch [244/250], Loss: 1.0374
Epoch [245/250], Loss: 1.0413
Epoch [246/250], Loss: 1.0427
Epoch [247/250], Loss: 1.0404
Epoch [248/250], Loss: 1.0421
Epoch [249/250], Loss: 1.0388
Epoch [250/250], Loss: 1.0391
Test Accuracy: 67.92%
```

11. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [238/250], Loss: 1.0386
Epoch [239/250], Loss: 1.0369
Epoch [240/250], Loss: 1.0350
Epoch [241/250], Loss: 1.0361
Epoch [242/250], Loss: 1.0397
Epoch [243/250], Loss: 1.0403
Epoch [244/250], Loss: 1.0411
Epoch [245/250], Loss: 1.0389
Epoch [246/250], Loss: 1.0372
Epoch [247/250], Loss: 1.0381
Epoch [248/250], Loss: 1.0383
Epoch [249/250], Loss: 1.0367
Epoch [250/250], Loss: 1.0386
Test Accuracy: 67.92%
```

12. Hidden Layer 2, jumlah neuron 32 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [238/250], Loss: 1.0361
Epoch [239/250], Loss: 1.0367
Epoch [240/250], Loss: 1.0364
Epoch [241/250], Loss: 1.0386
Epoch [242/250], Loss: 1.0429
Epoch [243/250], Loss: 1.0414
Epoch [244/250], Loss: 1.0370
Epoch [245/250], Loss: 1.0370
Epoch [246/250], Loss: 1.0417
Epoch [247/250], Loss: 1.0378
Epoch [248/250], Loss: 1.0403
Epoch [249/250], Loss: 1.0423
Epoch [250/250], Loss: 1.0364
Test Accuracy: 67.92%
```

13. Hidden Layer 1, jumlah neuron 64, epoch 250, learning rate 1 , Batch Size 512

```
Epoch [244/250], Loss: 0.9583
Epoch [245/250], Loss: 0.9581
Epoch [246/250], Loss: 0.9604
Epoch [247/250], Loss: 0.9555
Epoch [248/250], Loss: 0.9593
Epoch [249/250], Loss: 0.9579
Epoch [250/250], Loss: 0.9613
Test Accuracy: 75.72%
```

14. Hidden Layer 1, jumlah neuron 64, epoch 250, learning rate 0.1 , Batch Size 512

```
Epoch [243/250], Loss: 1.0385
Epoch [244/250], Loss: 1.0405
Epoch [245/250], Loss: 1.0384
Epoch [246/250], Loss: 1.0405
Epoch [247/250], Loss: 1.0389
Epoch [248/250], Loss: 1.0364
Epoch [249/250], Loss: 1.0360
Epoch [250/250], Loss: 1.0381
Test Accuracy: 67.92%
```

15. Hidden Layer 3, jumlah neuron 16 32 64, epoch 250, learning rate 10 , Batch Size 512

```
Epoch [242/250], Loss: 1.0361
Epoch [243/250], Loss: 1.0336
Epoch [244/250], Loss: 1.0352
Epoch [245/250], Loss: 1.0352
Epoch [246/250], Loss: 1.0338
Epoch [247/250], Loss: 1.0394
Epoch [248/250], Loss: 1.0358
Epoch [249/250], Loss: 1.0397
Epoch [250/250], Loss: 1.0386
Test Accuracy: 67.92%
```

Untuk kasus penggunaan softmax pada dataset ini kebanyakan memperoleh 67% di hamper semua setting hyperparameter tuning, karena bisa factor dari tidak seimbangnya dataset, overfitting/underfitting, terdapat masalah di fungsi loss karena softmax merupakan aktivasi yang mengubah vektor input menjadi distribusi probabilitas, dimana setiap elemen output adalah angka antara 0 dan 1, dan jumlah semua elemen output adalah 1.