

Neural Networks report – list 1

Agata Piasecka

Classification model

Best model summary

Hyperparameters for the best model:

learning rate = **0.0001**

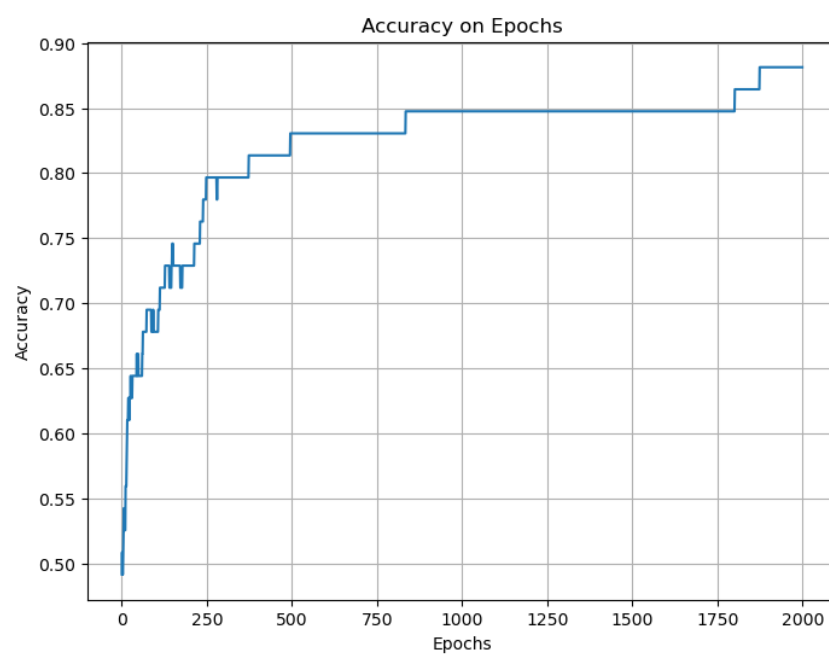
epochs = **2000**

batch sizes = **10**

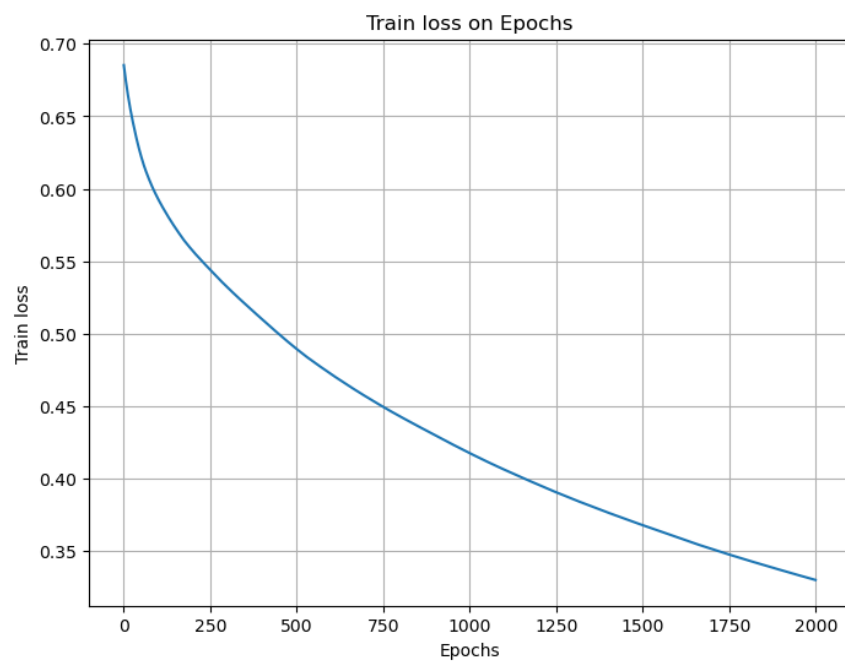
Validation accuracy: **88.136 %**

Test accuracy: **76.667 %**

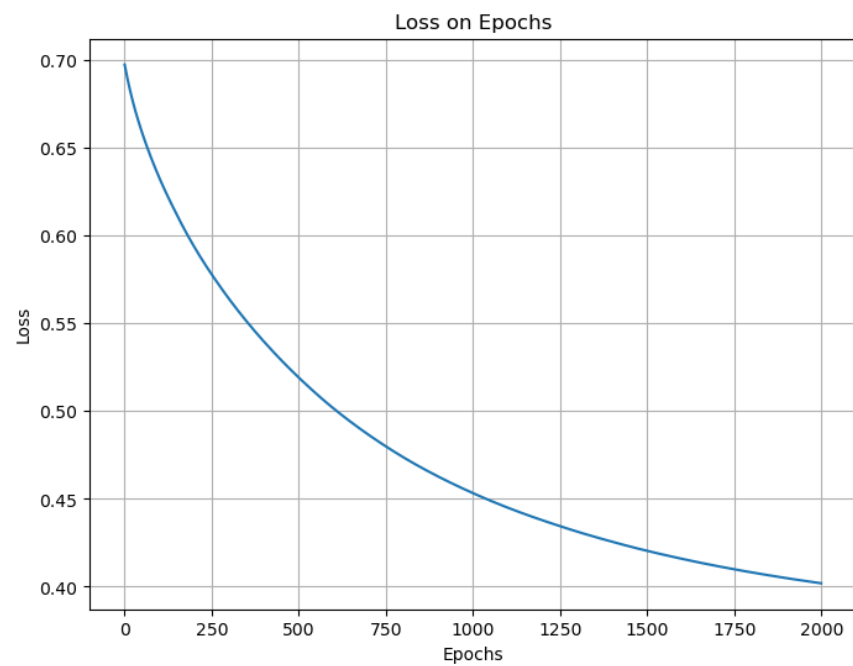
Graph 1. Validation accuracy on epochs.



Graph 2. Validation loss on epochs.



Graph 3. Training loss on epochs.



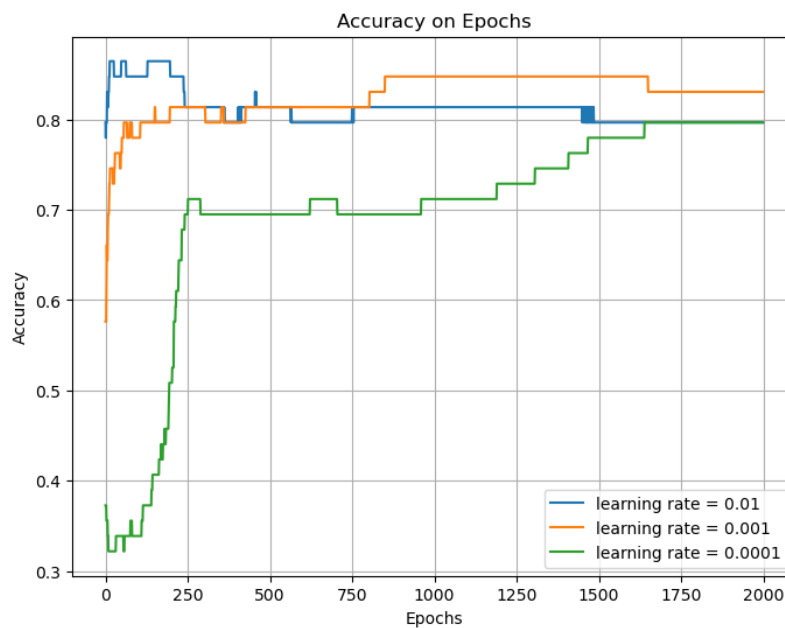
Experimental report

1. Learning rate

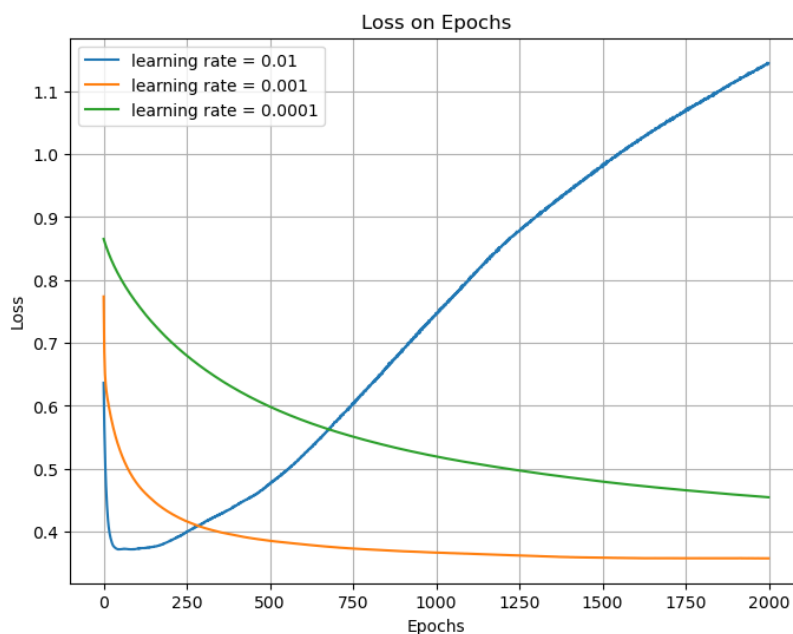
Table 1. Impact of learning rate on model performance

Type/learning rate	0.01	0.001	0.0001
Validation accuracy	0.797	0.831	0.797
Test accuracy	0.733	0.750	0.800

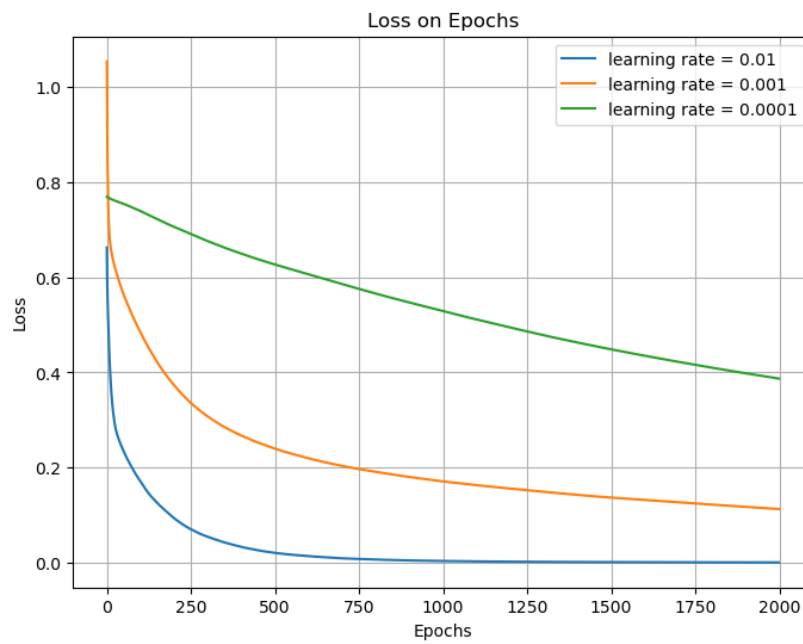
Graph 1. Validation accuracy on epochs for different learning rates.



Graph 2. Validation loss on epochs for different learning rates.



Graph 3. Training loss on epochs for different learning rates.

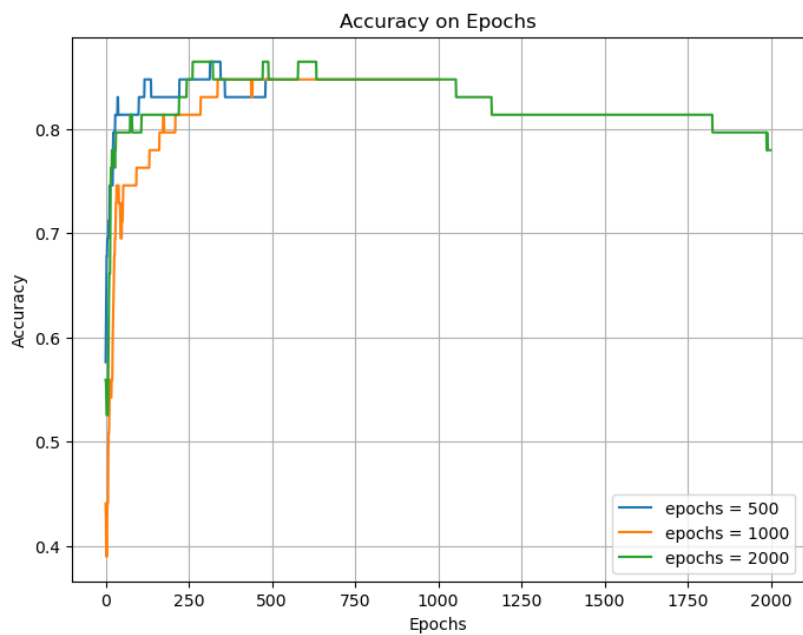


2. Epochs

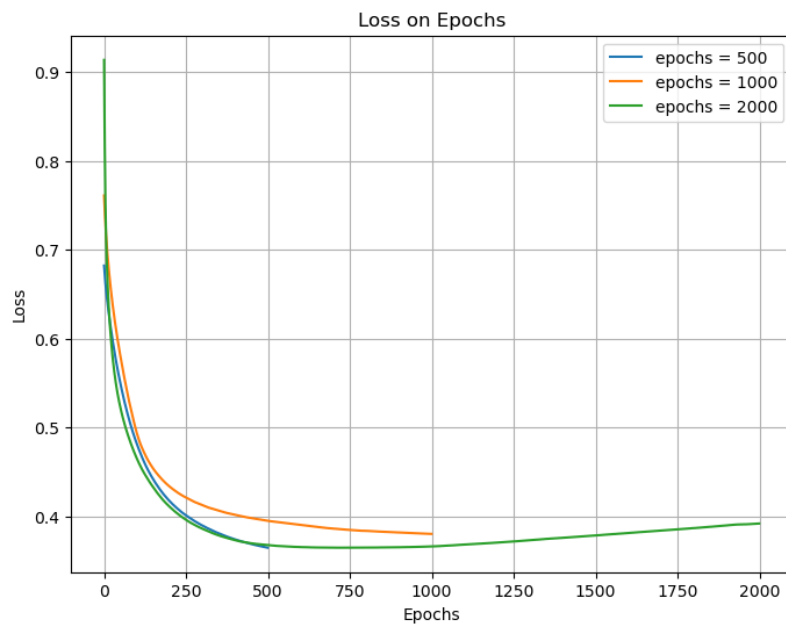
Table 2. Impact of epochs on model performance

Type/epochs	0.01	0.001	0.0001
Validation accuracy	0.847	0.847	0.780
Test accuracy	0.783	0.783	0.783

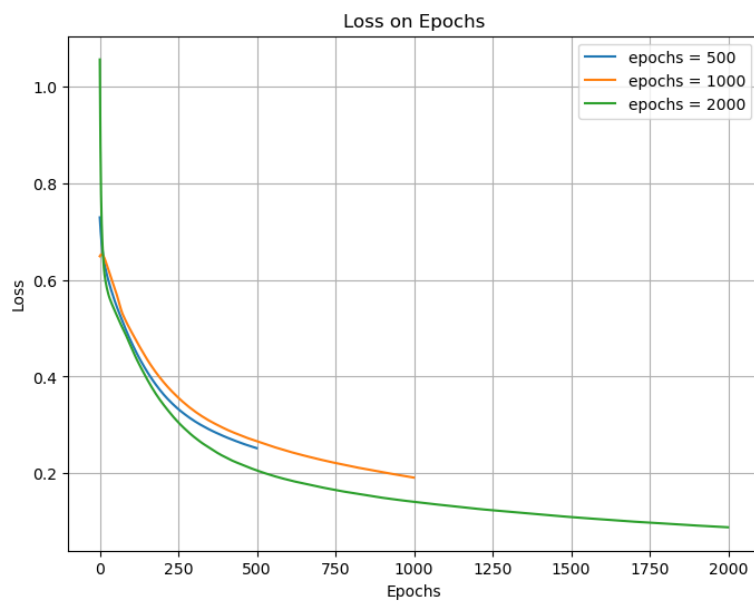
Graph 4. Validation accuracy on epochs.



Graph 5. Validation loss on epochs.



Graph 6. Training loss on epochs.



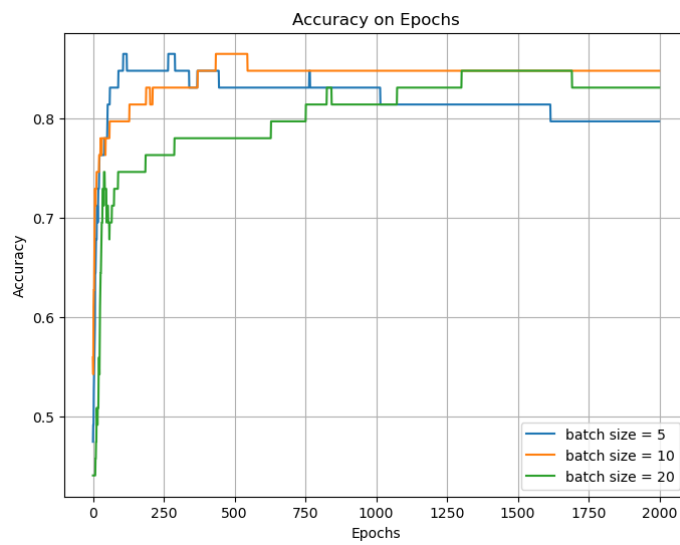
Comparing the validation and training loss, we can see that at the end there is overfitting, indicated by the increasing loss of validation loss.

3. Batch size

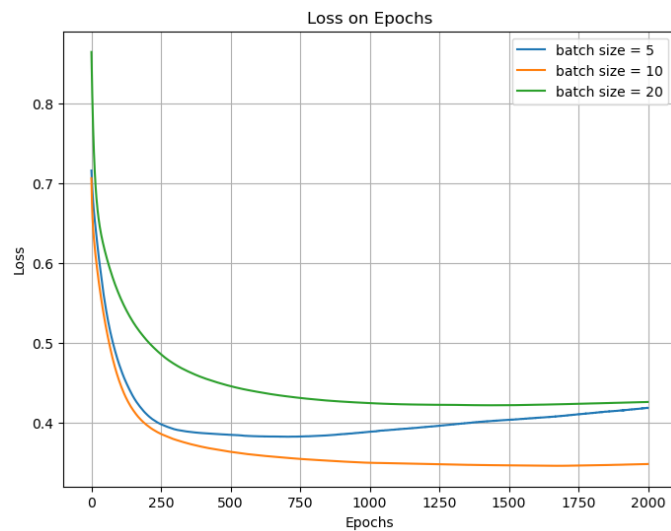
Table 3. Impact of batch size on model performance

Type/batch size	0.01	0.001	0.0001
Validation accuracy	0.796	0.847	0.831
Test accuracy	0.767	0.800	0.783

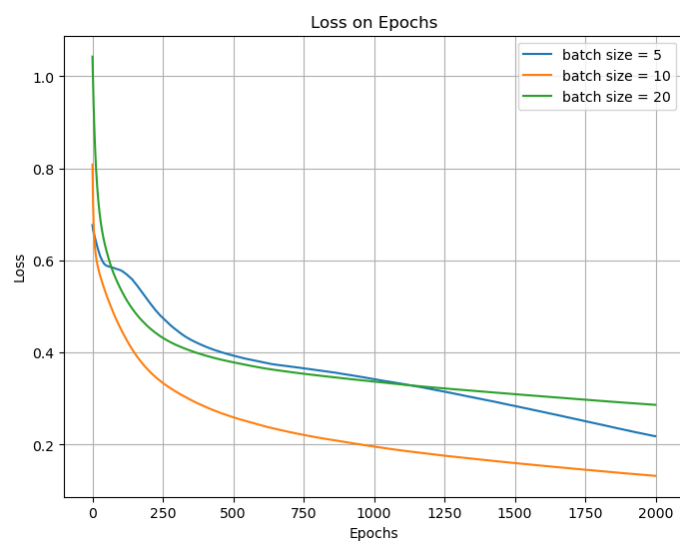
Graph 7. Validation accuracy on epochs.



Graph 8. Validation loss on epochs.



Graph 9. Training loss on epochs.



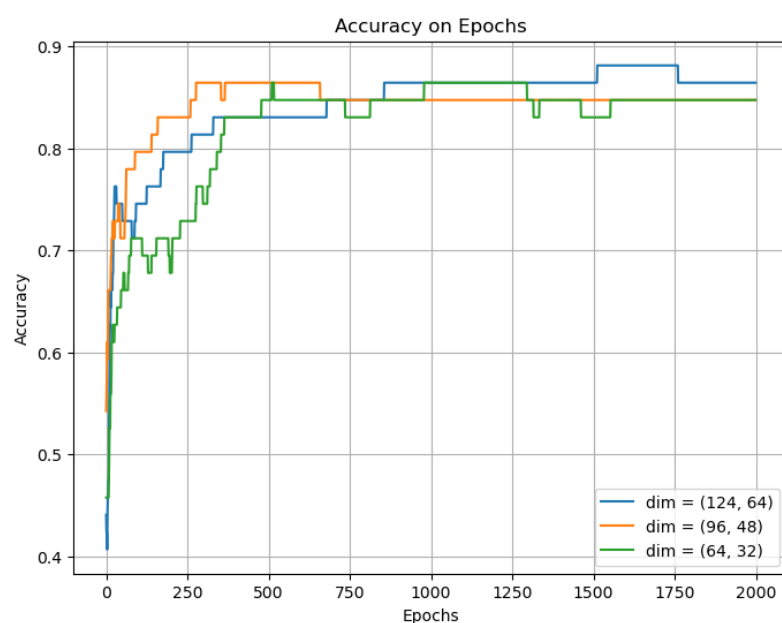
For batch sizes of 5 and 20, there is overfitting of the data present, indicated by increasing loss in validation loss as compared to the training loss curve.

4. Dimensionality

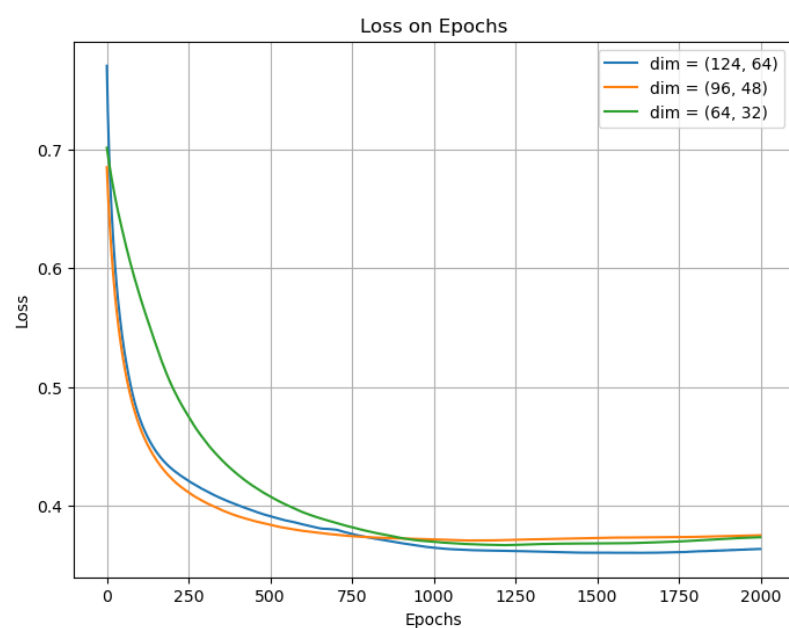
Table 4. Impact of model dimensionality on model performance

Type/dimensionality	(124,64)	(96,48)	(64,32)
Validation accuracy	0.864	0.847	0.847
Test accuracy	0.767	0.783	0.767

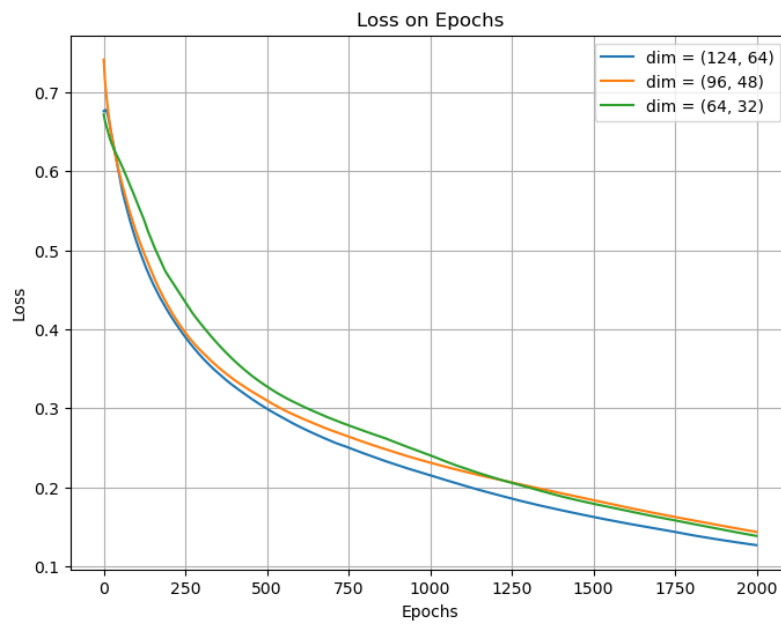
Graph 10. Validation accuracy on epochs.



Graph 11. Validation loss on epochs



Graph 12. Validation loss on epochs

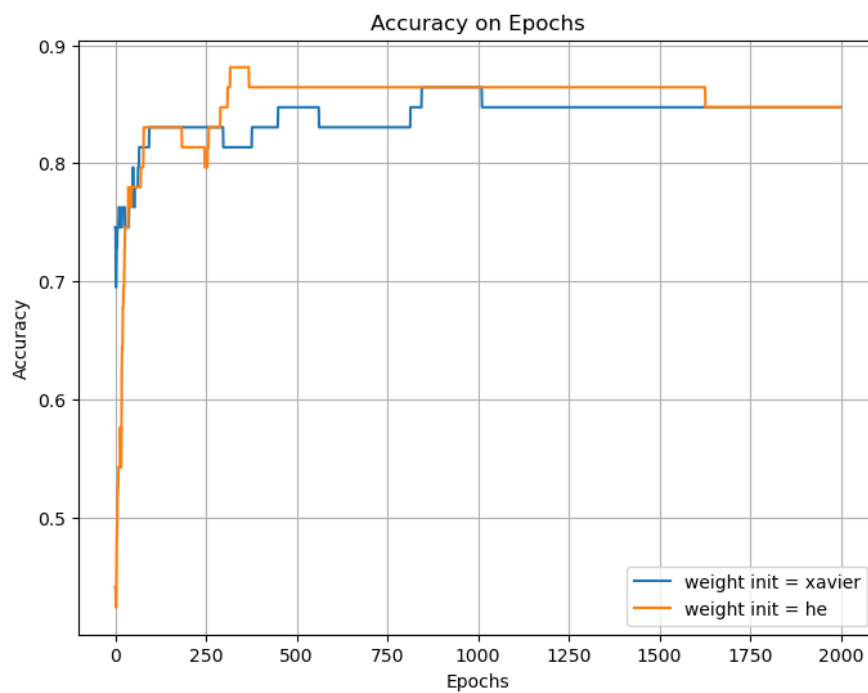


5. Weights initialization

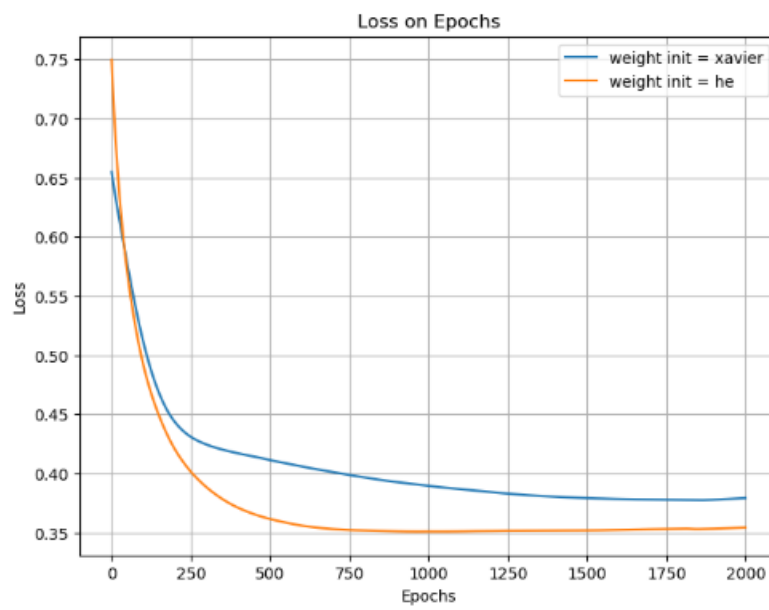
Table 5. Impact of weight initialization on model performance

Type/initialization type	xavier	he
Validation accuracy	0.847	0.847
Test accuracy	0.767	0.767

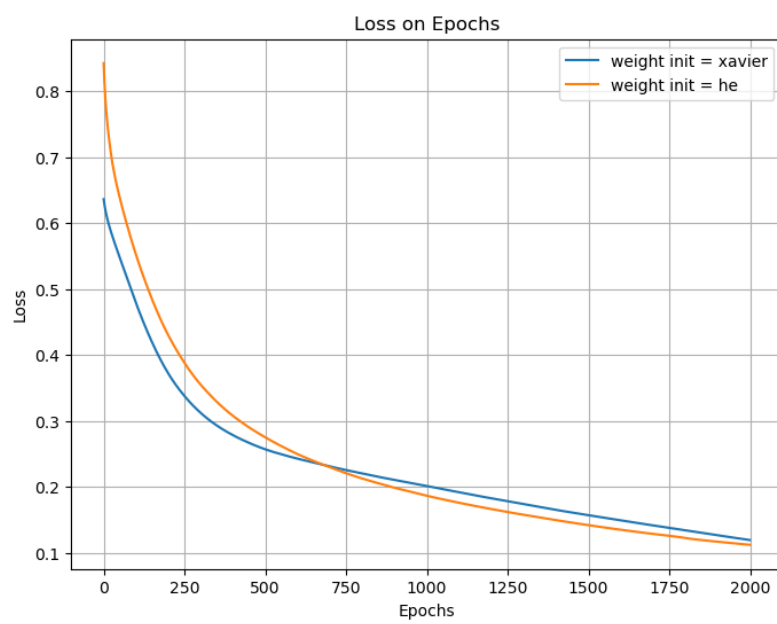
Graph 14. Validation accuracy on epochs



Graph 15. Validation loss on epochs



Graph 16. Training loss on epochs



Regression model

Best model summary

Hyperparameters for the best model:

learning rate = **0.00001**

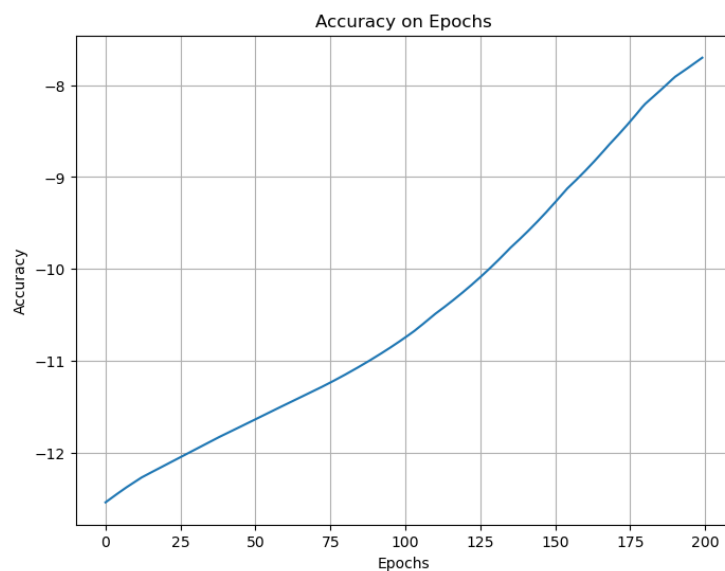
epochs = **200**

batch sizes = **20**

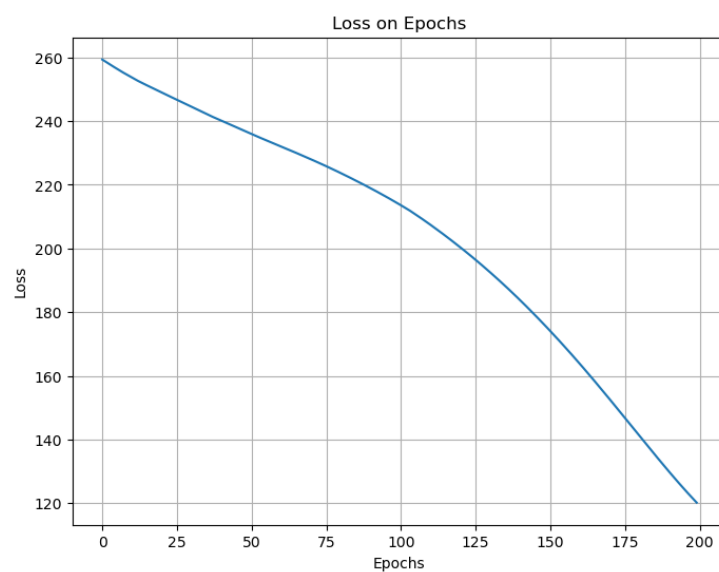
Validation accuracy: **-7.701**

Test accuracy: **-6.398**

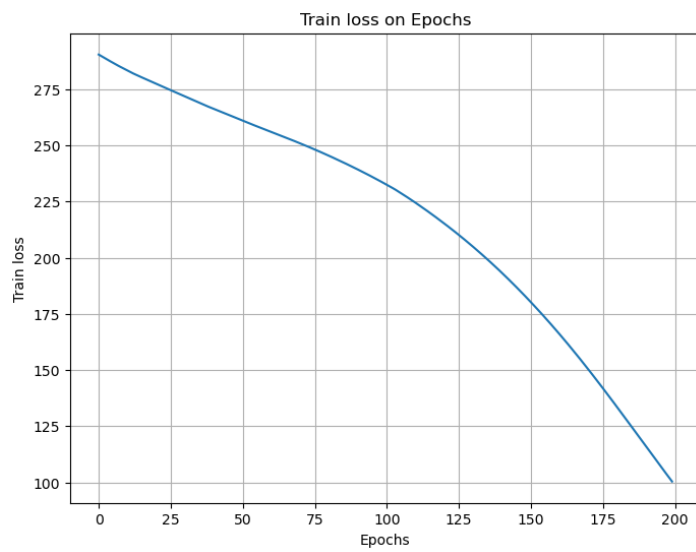
Graph 1. Validation accuracy on epochs.



Graph 2. Validation loss on epochs.



Graph 3. Training loss on epochs.



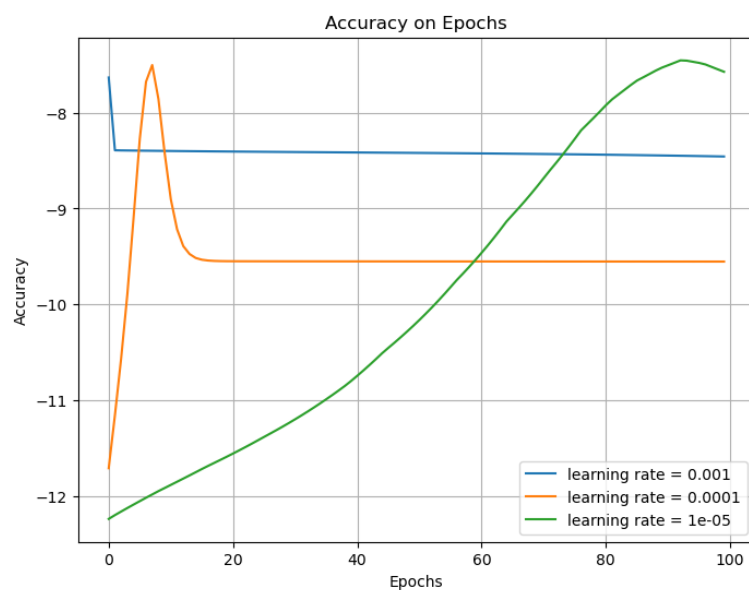
Experimental report

1. Learning rate

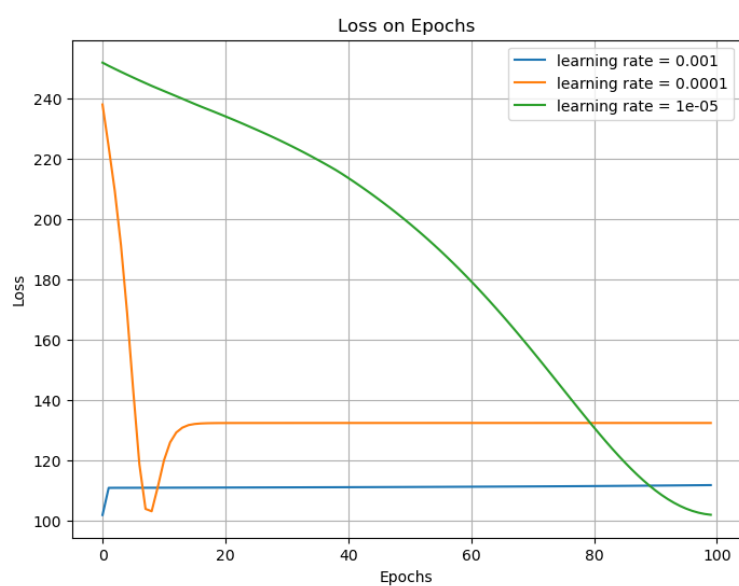
Table 6. Impact of learning rate on model performance

Type/learning rate	0.001	0.0001	0.00001
Validation accuracy	-8.457	-9.554	-7.573
Test accuracy	-8.818	-10.596	-7.025

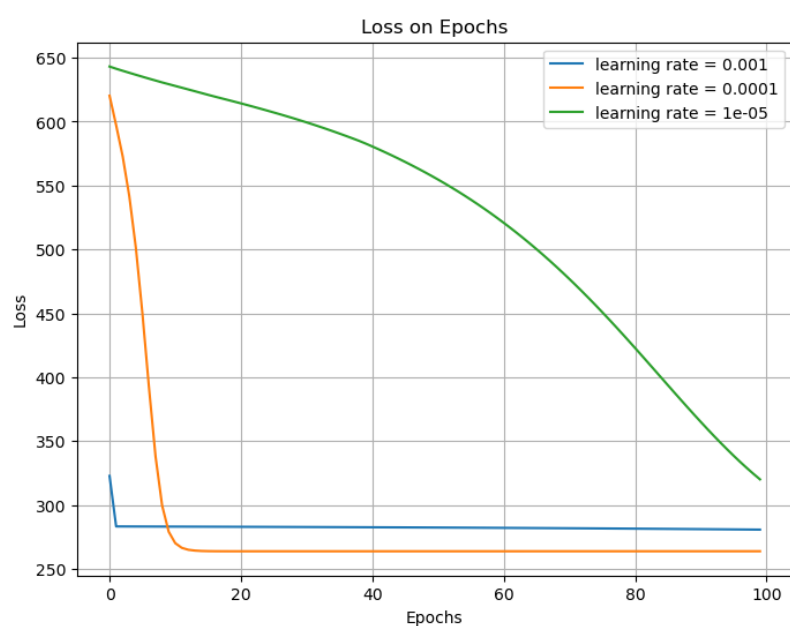
Graph 17. Validation accuracy on epochs



Graph 18. Validation loss on epochs



Graph 19. Training loss on epochs

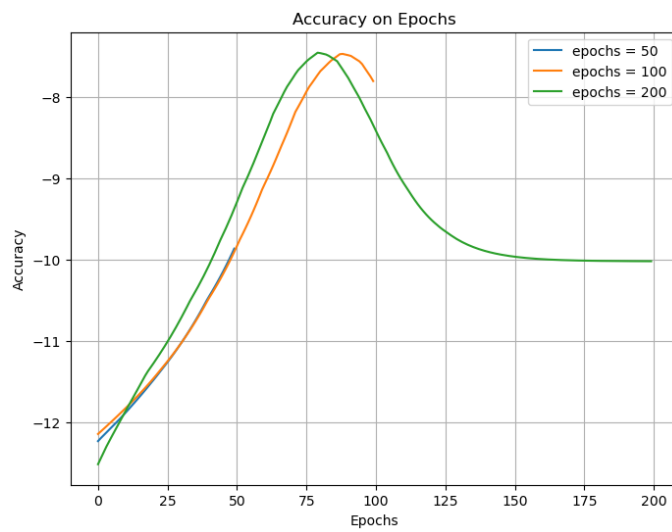


2. Epochs

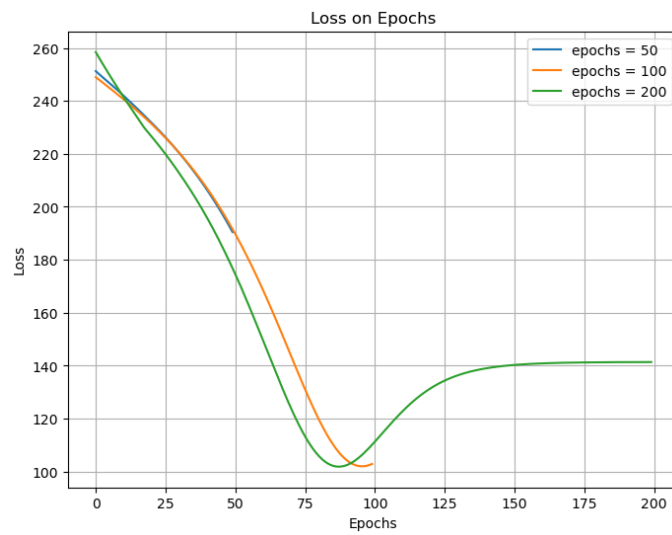
Table 7. Impact of epochs on model performance

Type/epochs	50	100	200
Validation accuracy	-9.863	-7.806	-10.017
Test accuracy	-8.071	-7.590	-11.174

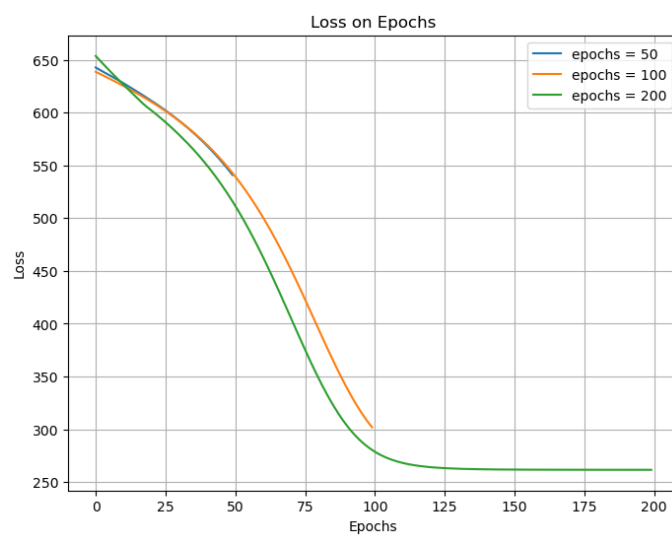
Graph 20. Validation accuracy on epochs



Graph 21. Validation loss on epochs



Graph 22. Training loss on epochs

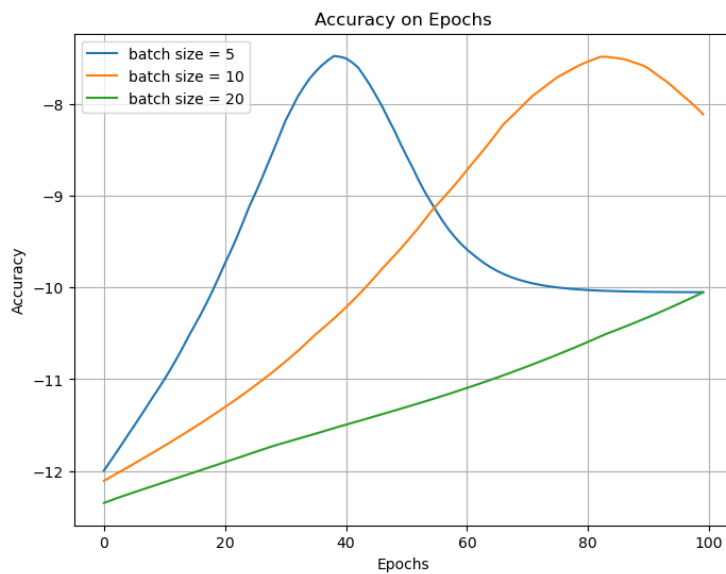


3. Batch size

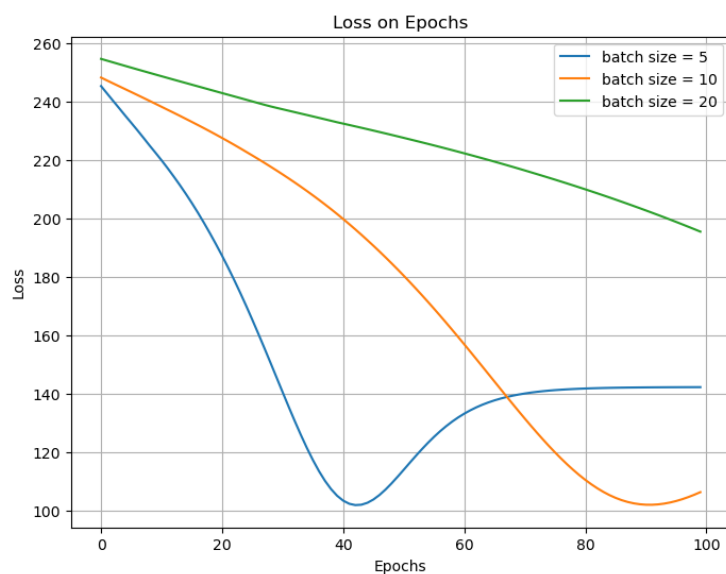
Table 8. Impact of batch size on model performance

Type/batch size	5	10	20
Validation accuracy	-10.052	-8.114	-10.053
Test accuracy	-11.234	-8.267	-8.217

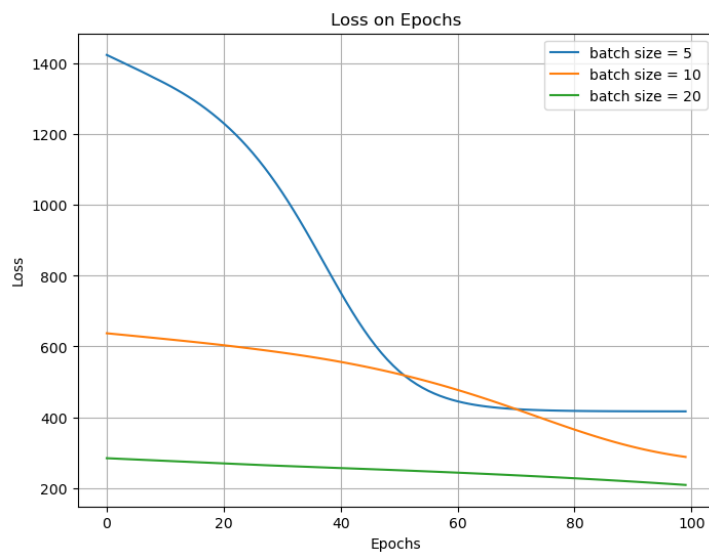
Graph 23. Validation accuracy on epochs



Graph 24. Validation loss on epochs



Graph 25. Training loss on epochs

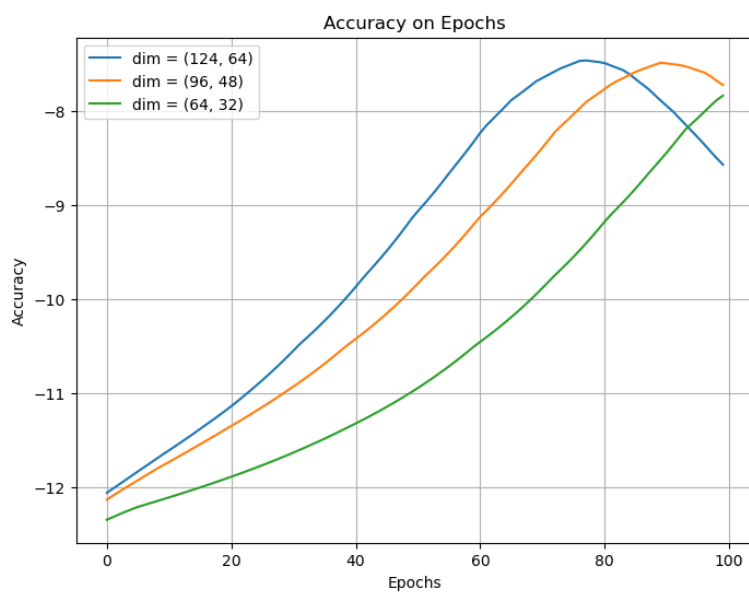


4. Dimensionality

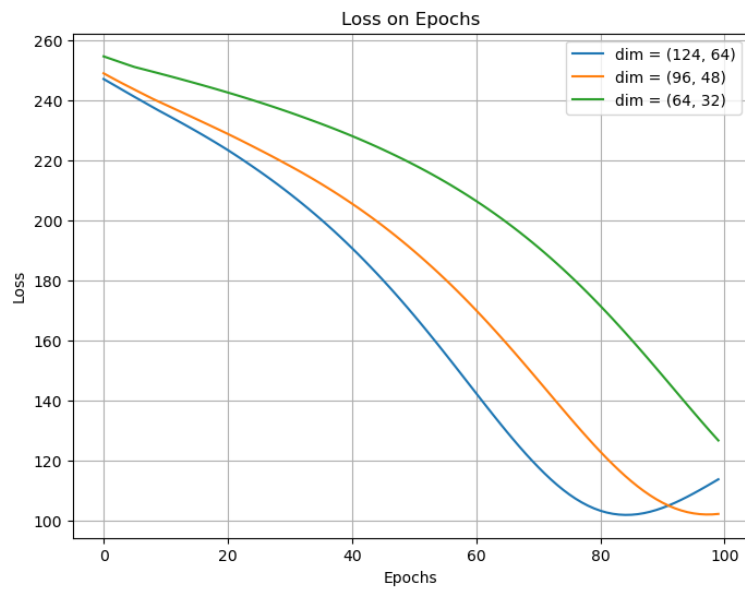
Table 9. Impact of dimensionality on model performance

Type/dimensionality	(124,64)	(96,48)	(64,32)
Validation accuracy	-8.568	-7.721	-7.832
Test accuracy	-9.103	-7.371	-6.465

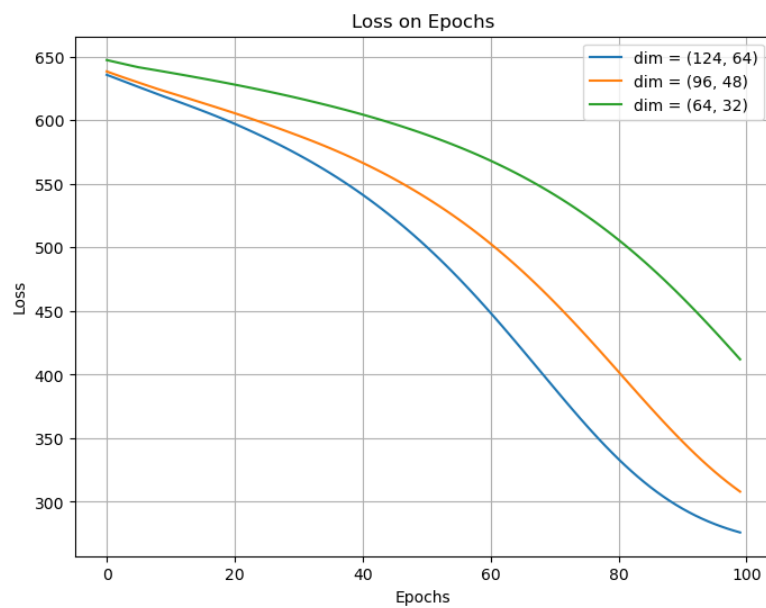
Graph 26. Validation accuracy on epochs



Graph 27. Validation loss on epochs



Graph 28. Training loss on epochs

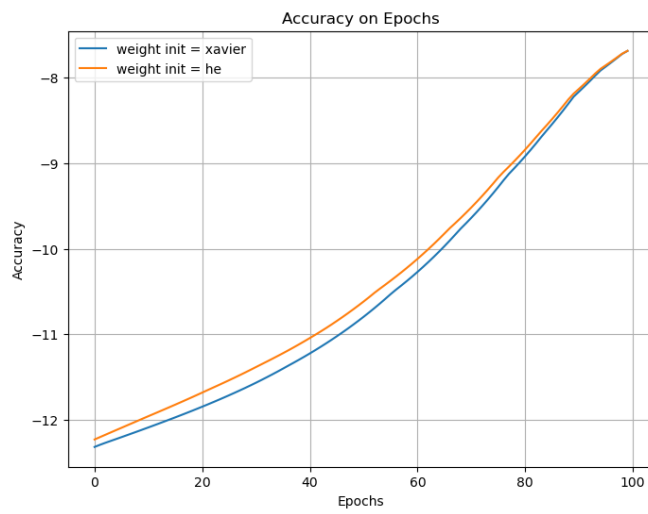


5. Weight initialization

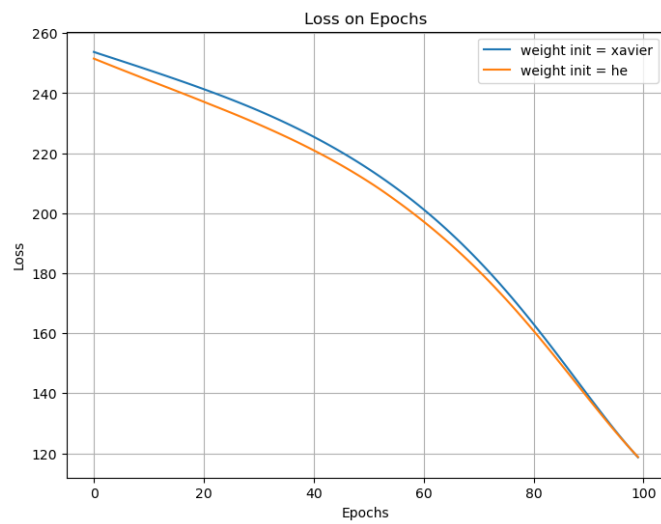
Table 10. Impact of weight initialization on model performance

Type/initialization	xavier	he
Validation accuracy	-7.684	-7.683
Test accuracy	-6.399	-6.398

Graph 29. Validation accuracy on epochs



Graph 30. Validation loss on epochs



Graph 32. Training loss on epochs

