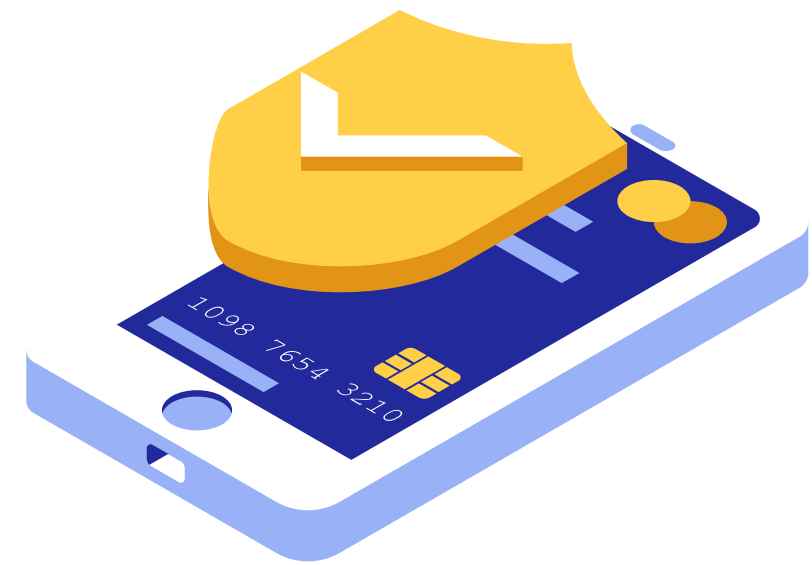


Banking Dataset Classification

Abdullah Alsaedi
Raneem Alshaye
Jana Saadawi

Introduction

- Bank is facing a revenue decline.
- The decline is due to low investments in long-term deposits.
- The bank aims to identify customers with a higher likelihood of subscribing to long-term deposits.
- Targeted marketing efforts will be focused on these identified customers.



Dataset

- Rows : 32951
- Columns : 16

age	job	marital	education	default	housing	loan	contact	month	day_of_we	duration	campaign	pdays	previous	poutcome	y
49	blue-collar	married	basic.9y	unknown	no	no	cellular	nov	wed	227	4	999	0	nonexistent	no
37	entrepreneur	married	university.degree	no	no	no	telephone	nov	wed	202	2	999	1	failure	no
78	retired	married	basic.4y	no	no	no	cellular	jul	mon	1148	1	999	0	nonexistent	yes
36	admin.	married	university.degree	no	yes	no	telephone	may	mon	120	2	999	0	nonexistent	no
59	retired	divorced	university.degree	no	no	no	cellular	jun	tue	368	2	999	0	nonexistent	no
29	admin.	single	university.degree	no	no	no	cellular	aug	wed	256	2	999	0	nonexistent	no
26	student	single	basic.9y	no	no	no	telephone	aug	wed	449	1	999	0	nonexistent	yes
30	blue-collar	married	basic.4y	no	yes	no	cellular	nov	wed	126	2	999	0	nonexistent	no
50	blue-collar	married	basic.4y	unknown	no	no	telephone	may	fri	574	1	999	0	nonexistent	no
33	admin.	single	high.school	no	yes	no	cellular	jul	tue	498	5	999	0	nonexistent	no
44	services	divorced	high.school	no	yes	no	cellular	jul	mon	158	5	999	0	nonexistent	no
32	technician	married	university.degree	no	yes	no	telephone	may	fri	93	5	999	0	nonexistent	no
26	self-employed	single	professional.course	no	yes	no	cellular	jul	thu	71	1	999	0	nonexistent	no
43	management	married	university.degree	no	no	yes	telephone	jul	thu	203	1	999	0	nonexistent	no
56	blue-collar	married	basic.9y	no	no	no	cellular	may	thu	369	1	999	0	nonexistent	no
40	blue-collar	married	basic.9y	no	yes	no	cellular	may	wed	954	1	999	0	nonexistent	yes
32	admin.	divorced	university.degree	no	yes	no	cellular	aug	tue	105	1	999	0	nonexistent	no
47	technician	single	professional.course	unknown	no	no	telephone	may	tue	148	5	999	0	nonexistent	no
50	services	single	basic.4y	no	yes	no	telephone	may	tue	98	9	999	0	nonexistent	no

Neural network architecture and its hyper-parameters

... Model: "sequential"

...

Layer (type)	Output Shape	Param #
dense (Dense)	(None, 32)	1,472
dense_1 (Dense)	(None, 16)	528
dense_2 (Dense)	(None, 8)	136
dense_3 (Dense)	(None, 1)	9

... Total params: 6,437 (25.15 KB)

... Trainable params: 2,145 (8.38 KB)

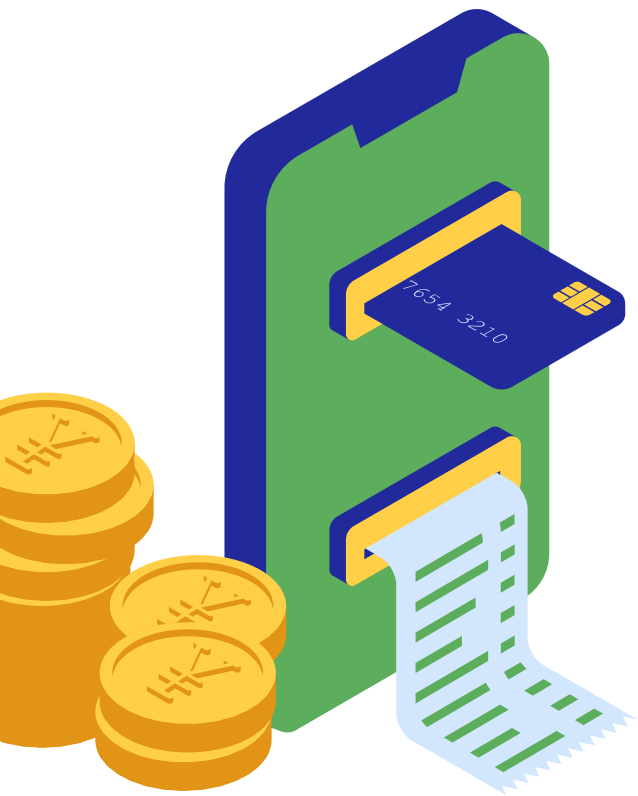
... Non-trainable params: 0 (0.00 B)

Best number of hidden layers: 4
 Best number of neurons per layer: 74
 Best learning rate: 0.00905127409782462
 Best optimizer: adam

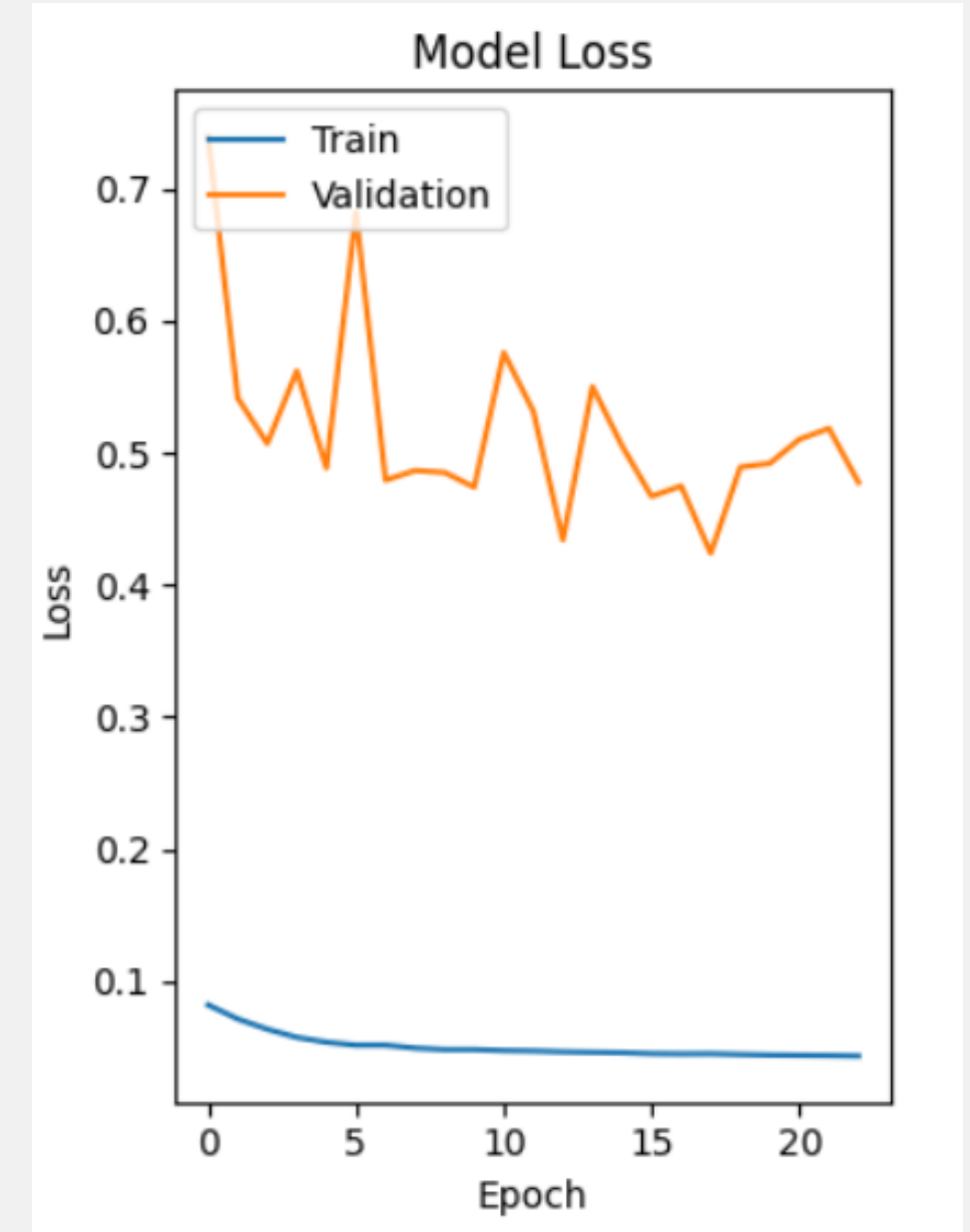
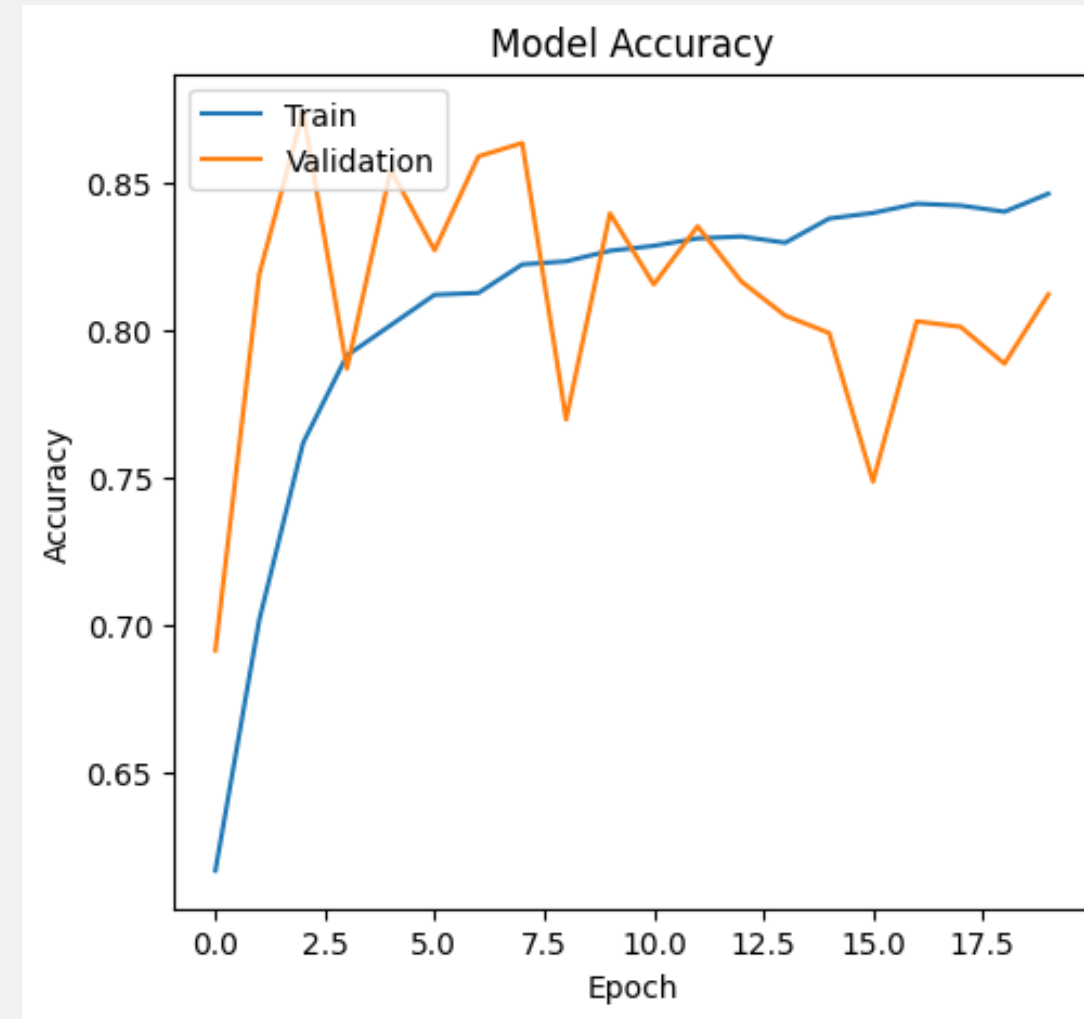
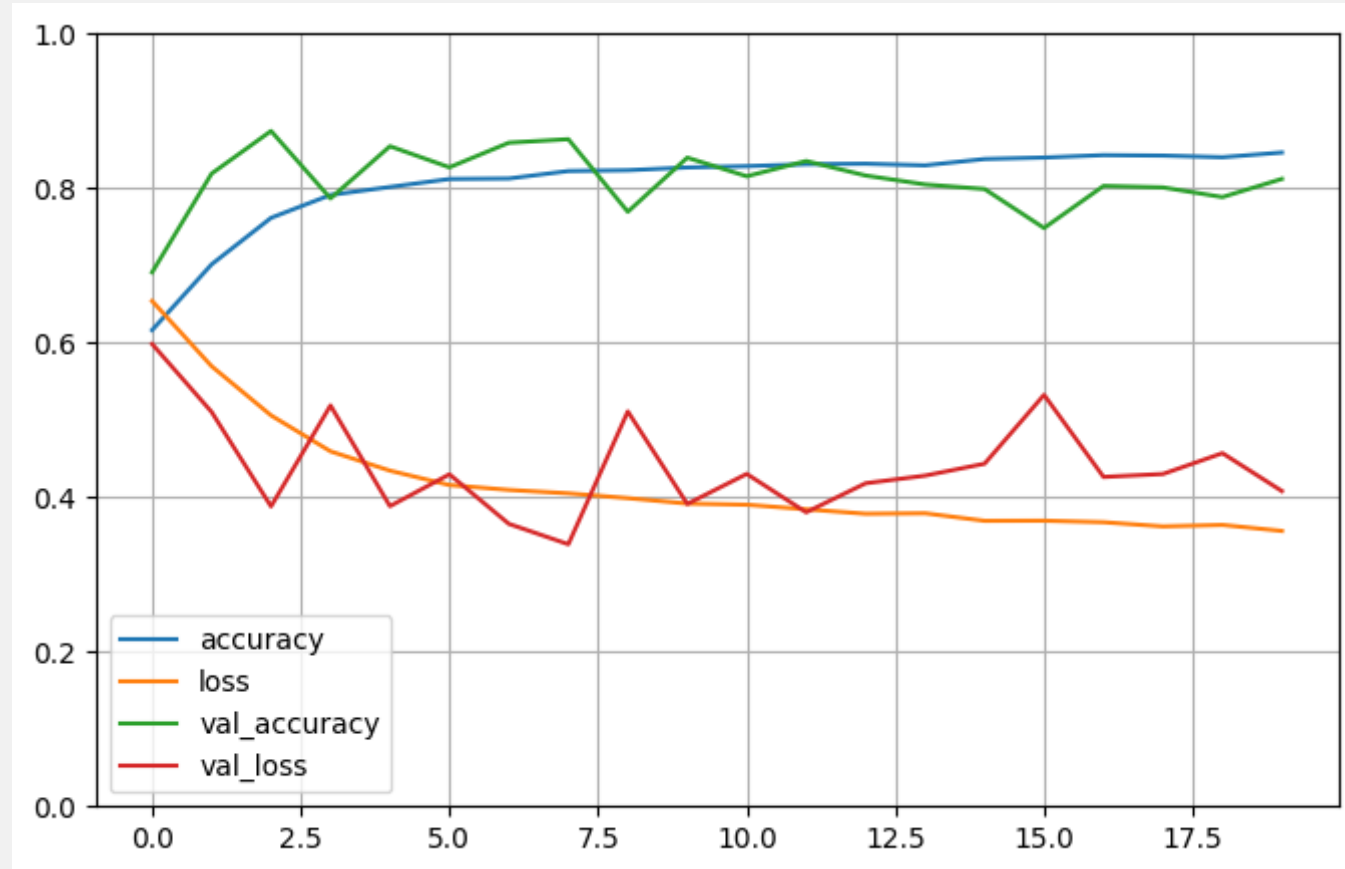
Neural network performance

Neural network : Test Loss: 0.53, Test Accuracy: 0.77

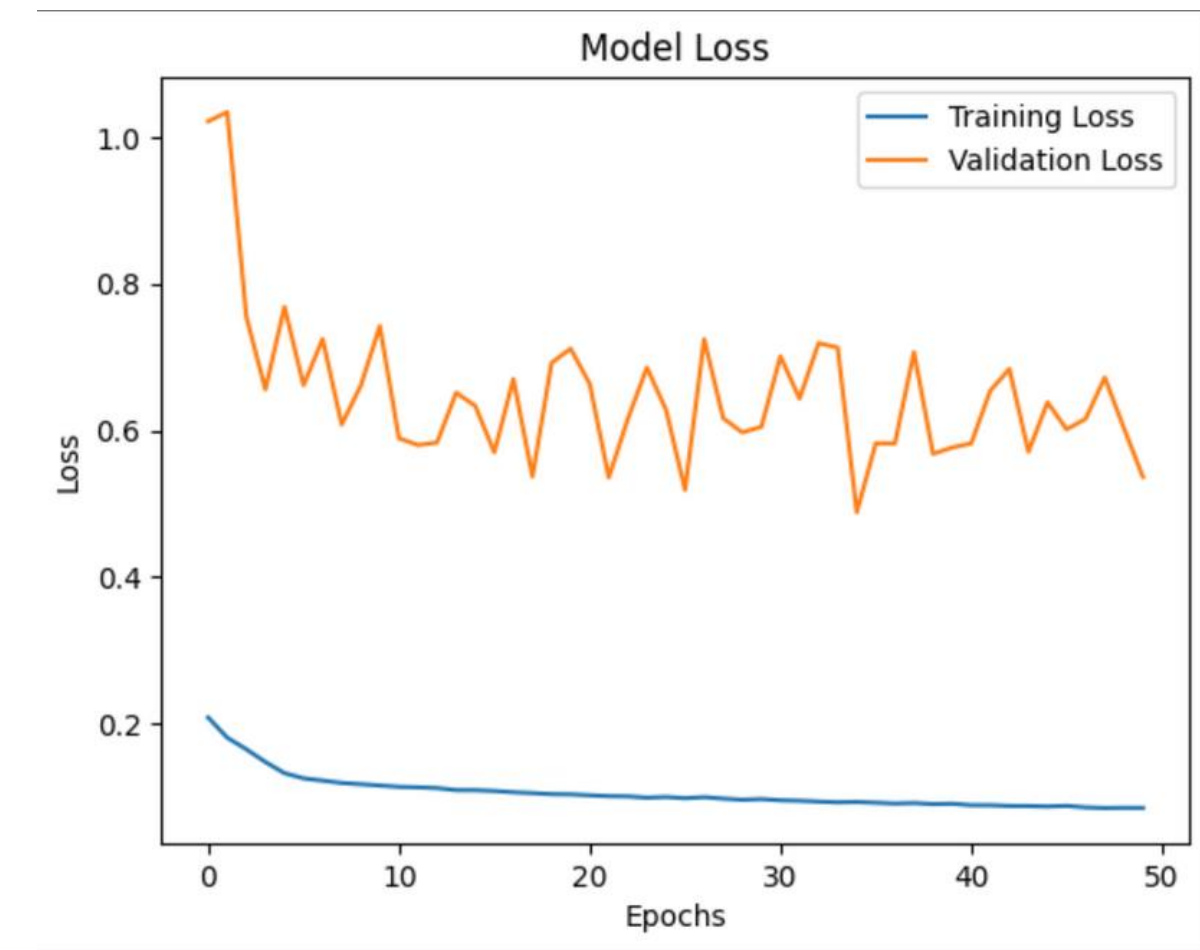
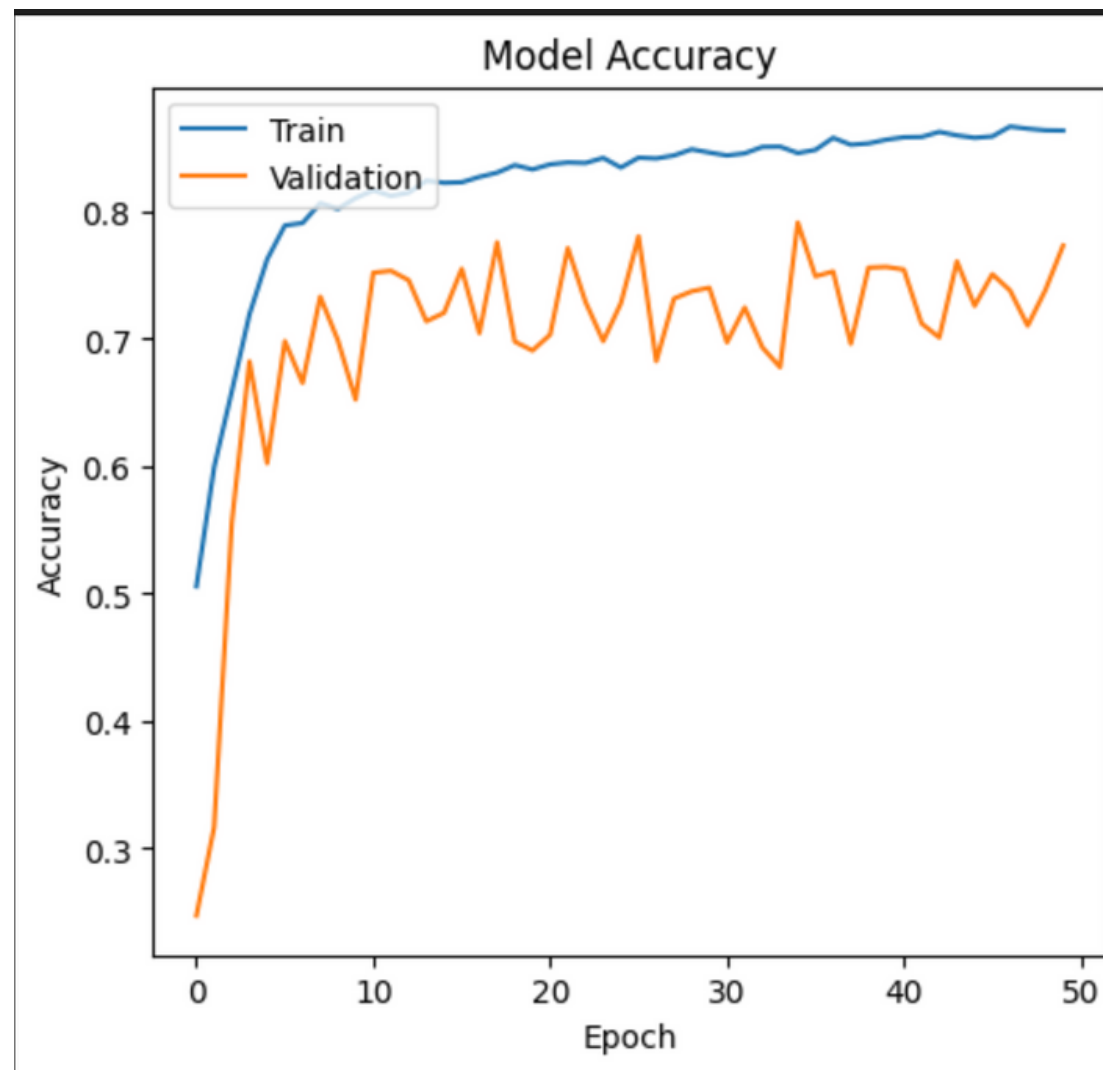
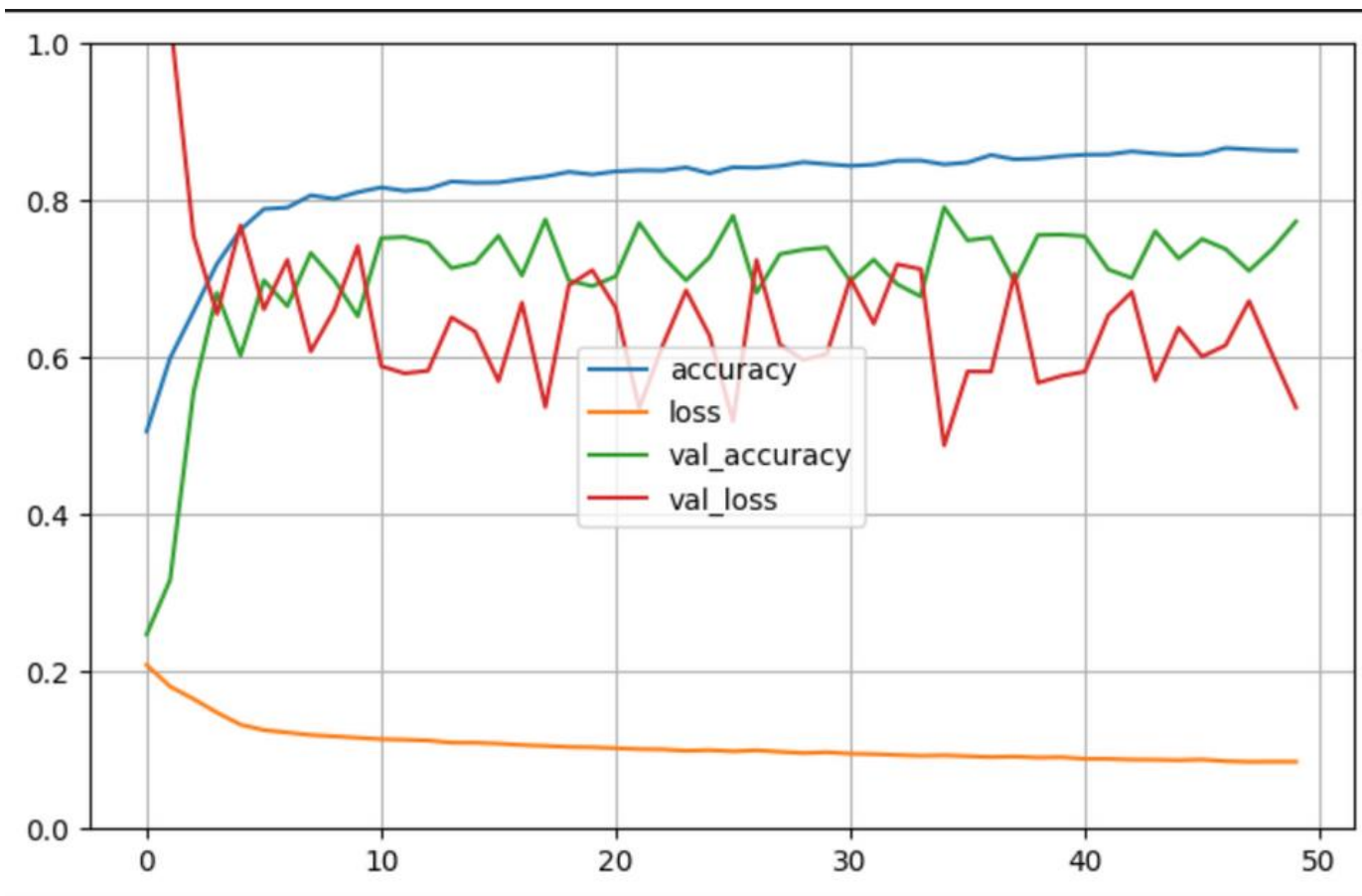
Hyperparameter : Test Loss: 0.40, Test Accuracy: 0.82



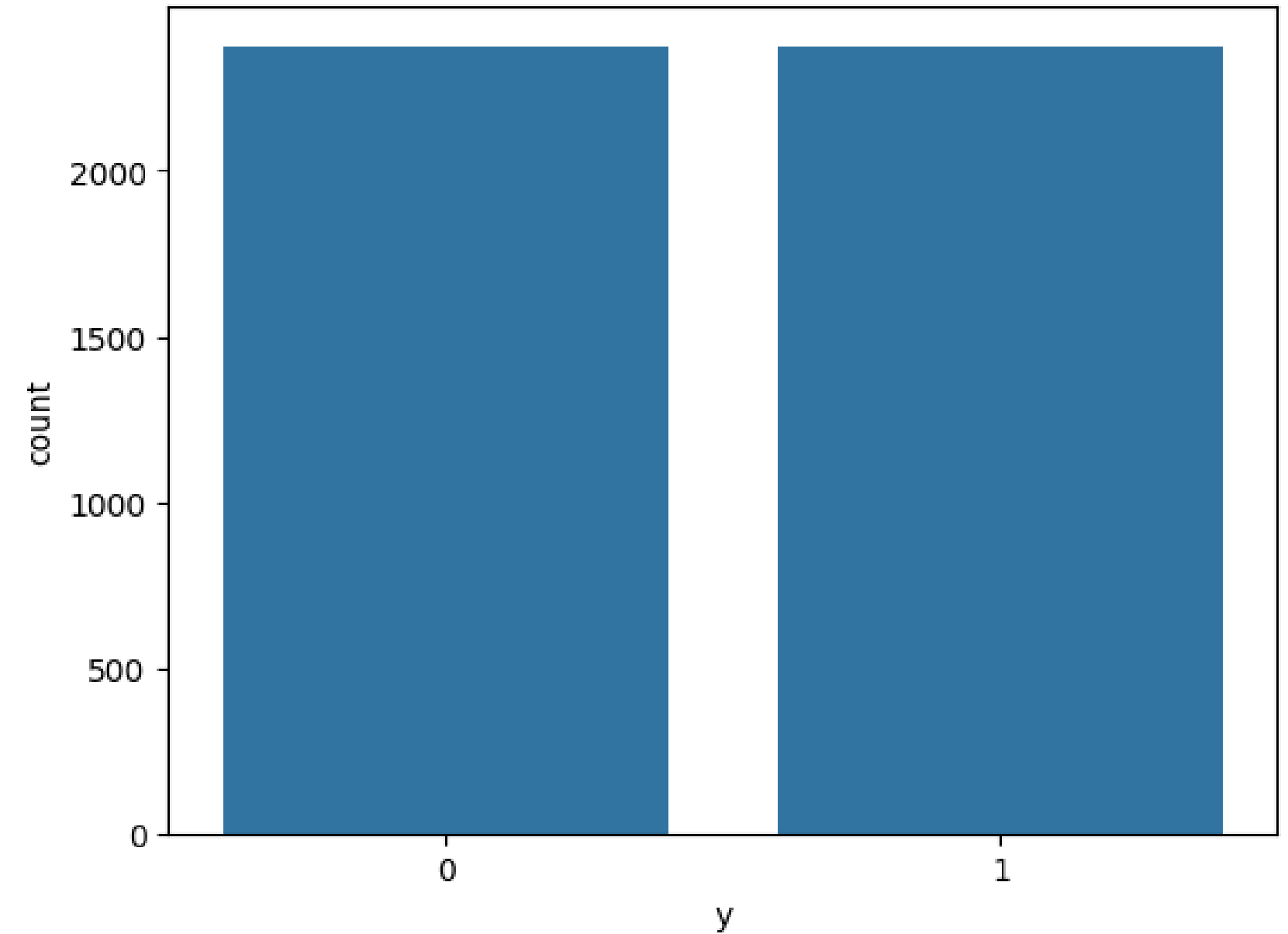
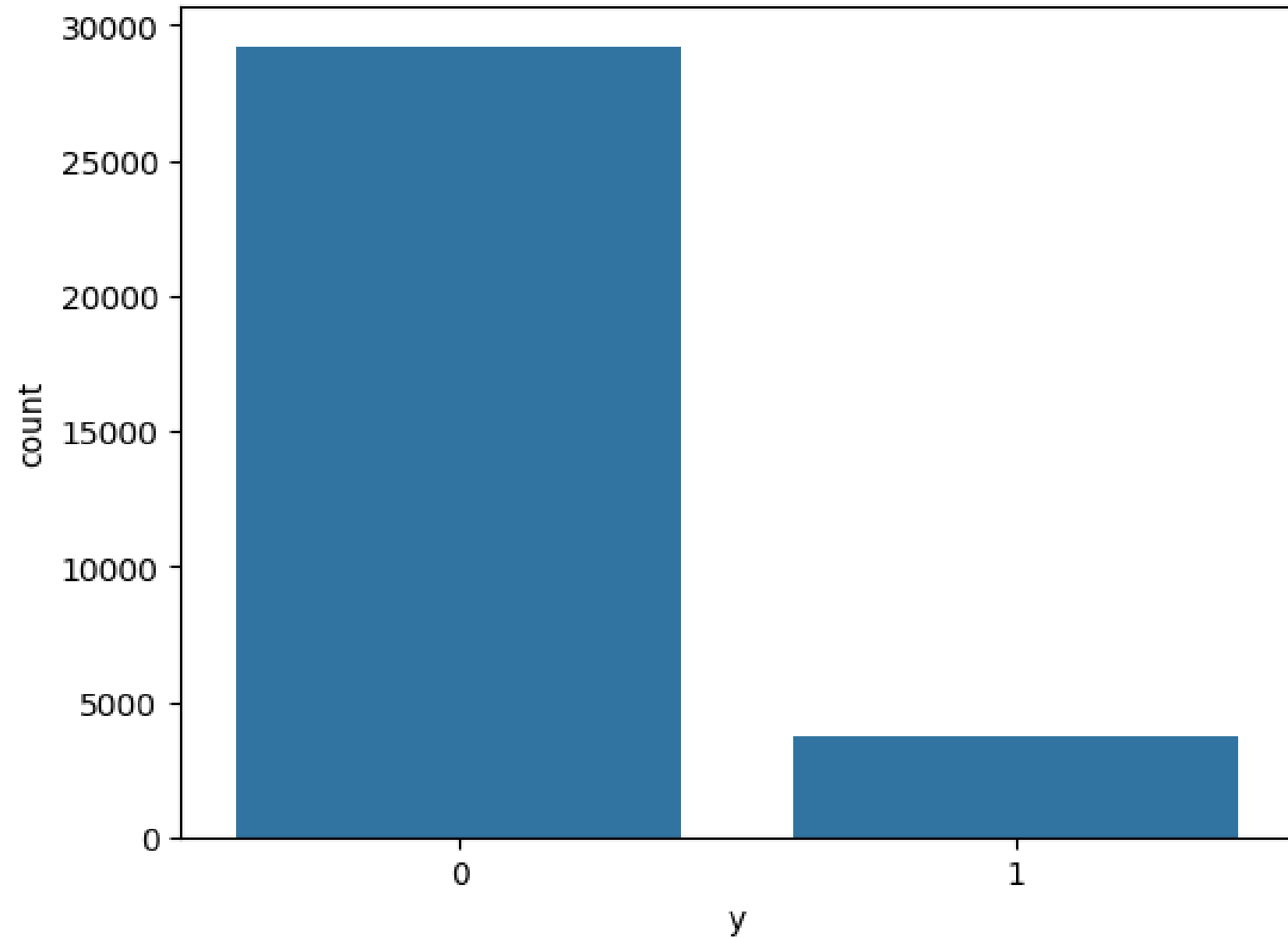
Evaluating Model Performance



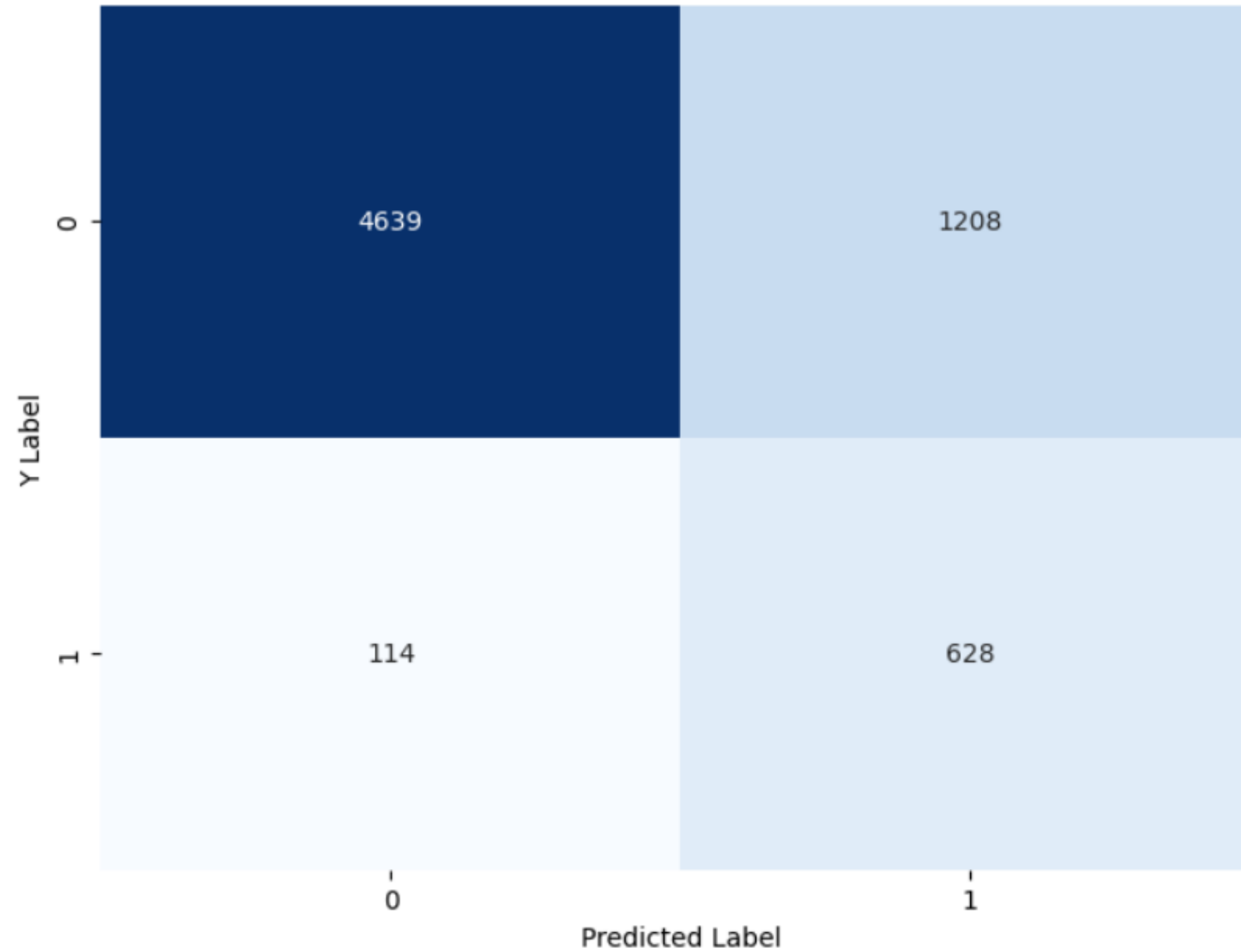
Implementing Early Stopping & Weighted Loss & Handling Imbalanced Data with Under Sample



Imbalance in Target Variable



Confusion Matrix



Conclusion

We addressed the challenge of an imbalanced dataset through under-Sampler, and we also enhanced our model's performance by optimizing the neural network's hyperparameters and using early stopping and weighted loss.



Question

How can we let the model train on class 1 ?



Thank you

