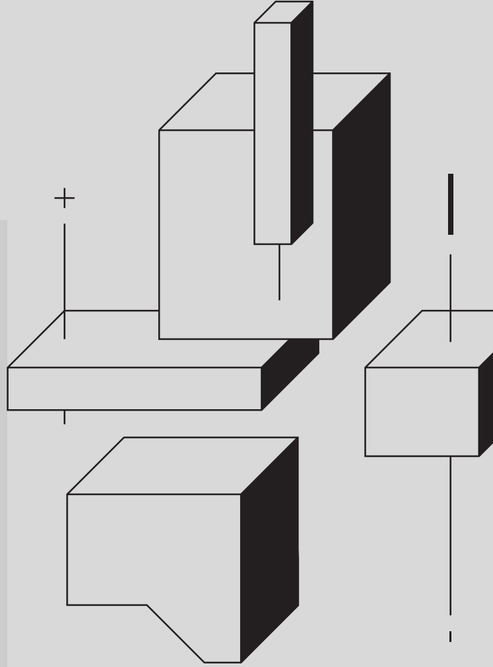
Final project
Smile detection

Course: CS 319 Computer Vision

Lecturer : Arman Chopikyan

Presenters: Hakob Janesian
Vahan Yeranosyan



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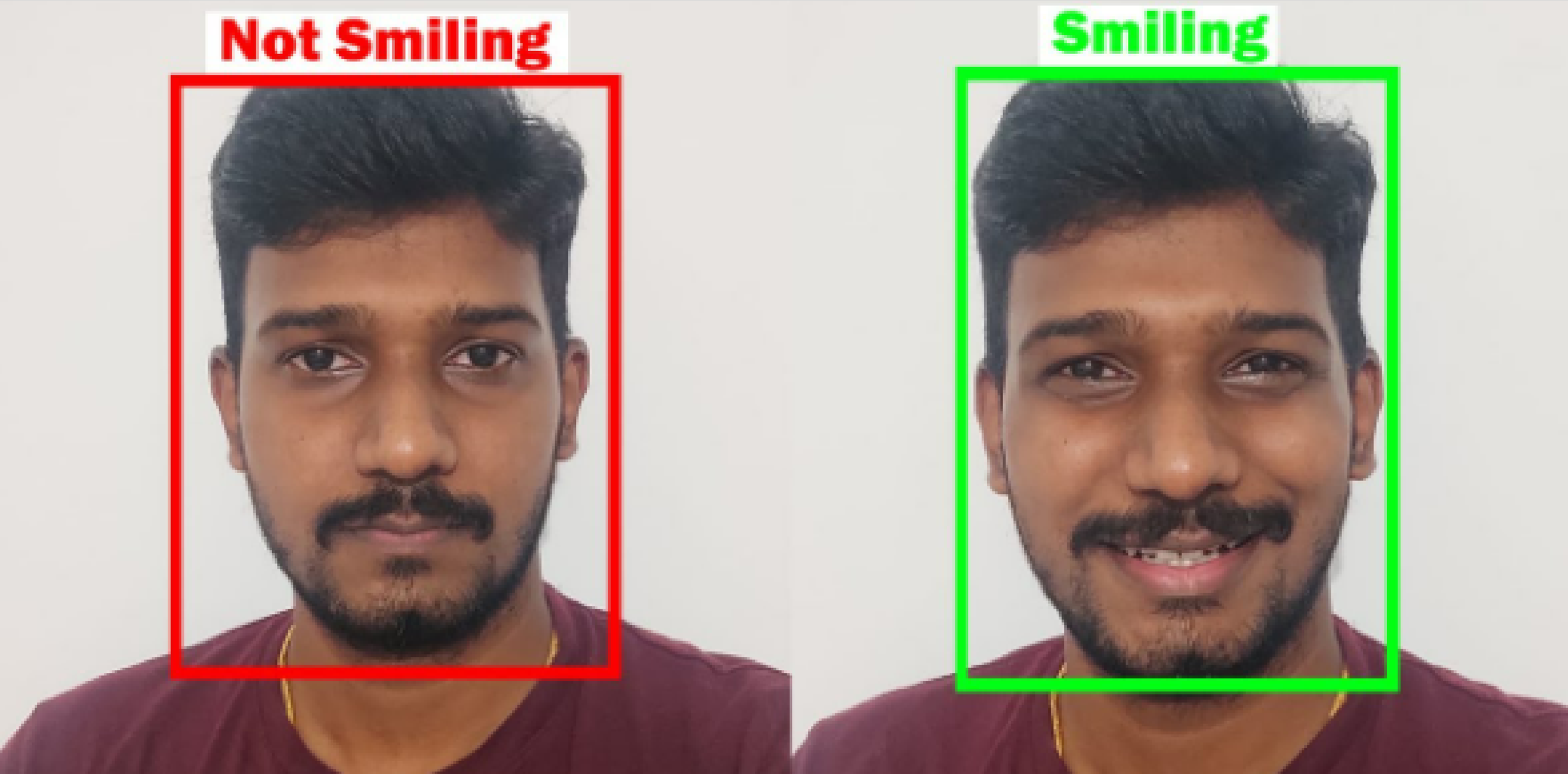
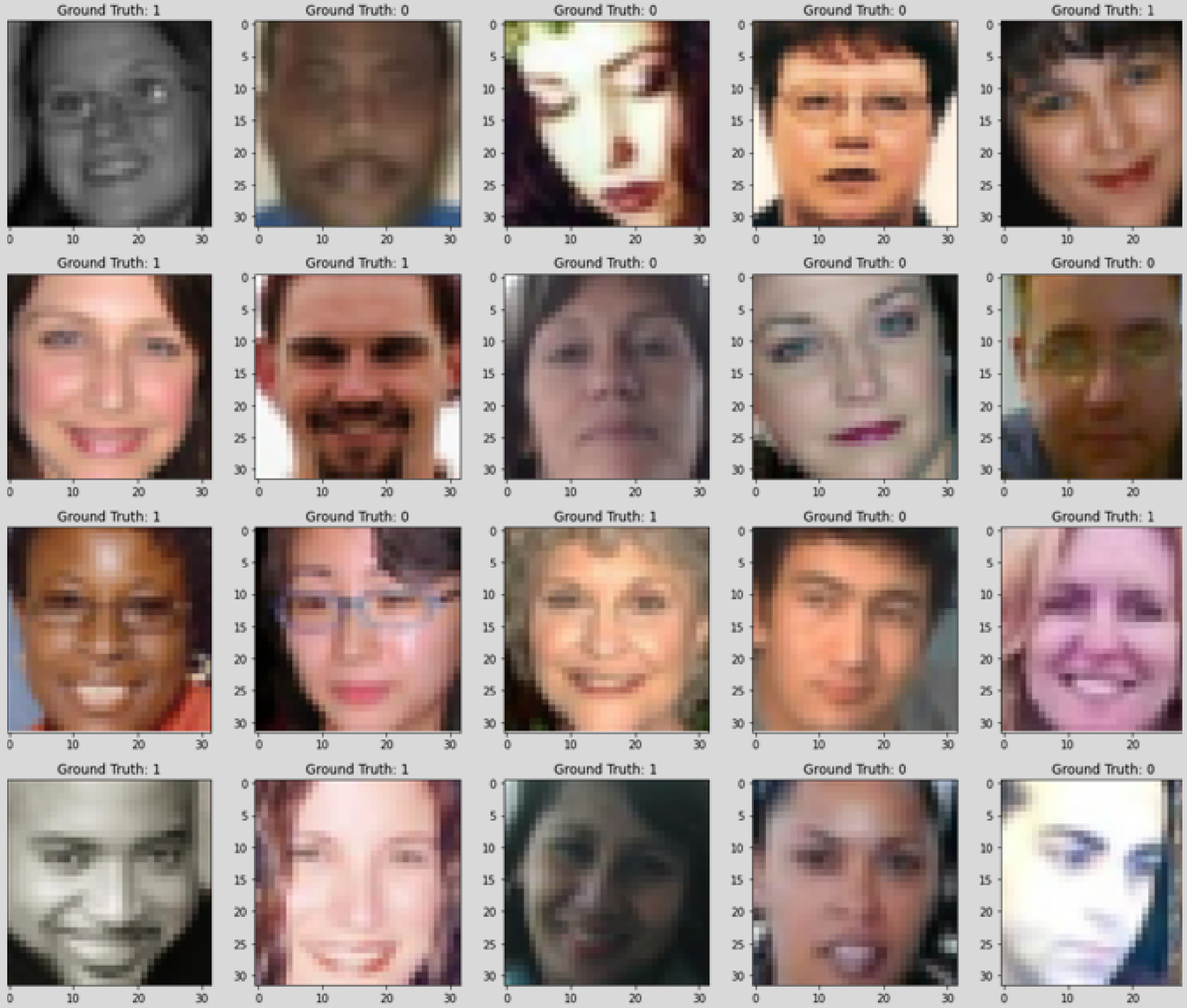
Outline

- Introduction
- Dataset: GENKI 4K Smile detection Dataset
- LeNet-5
- ResNet-50
- Custom self-attention based model
- Summary Table

Introduction

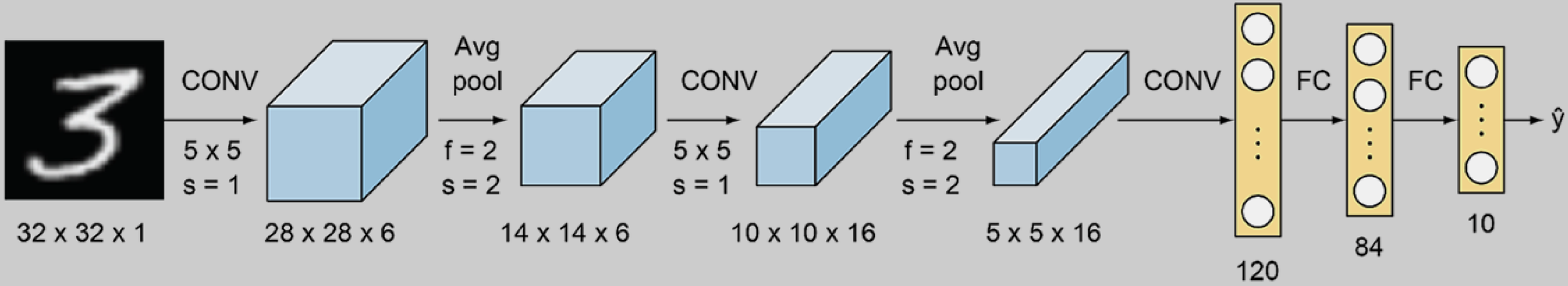




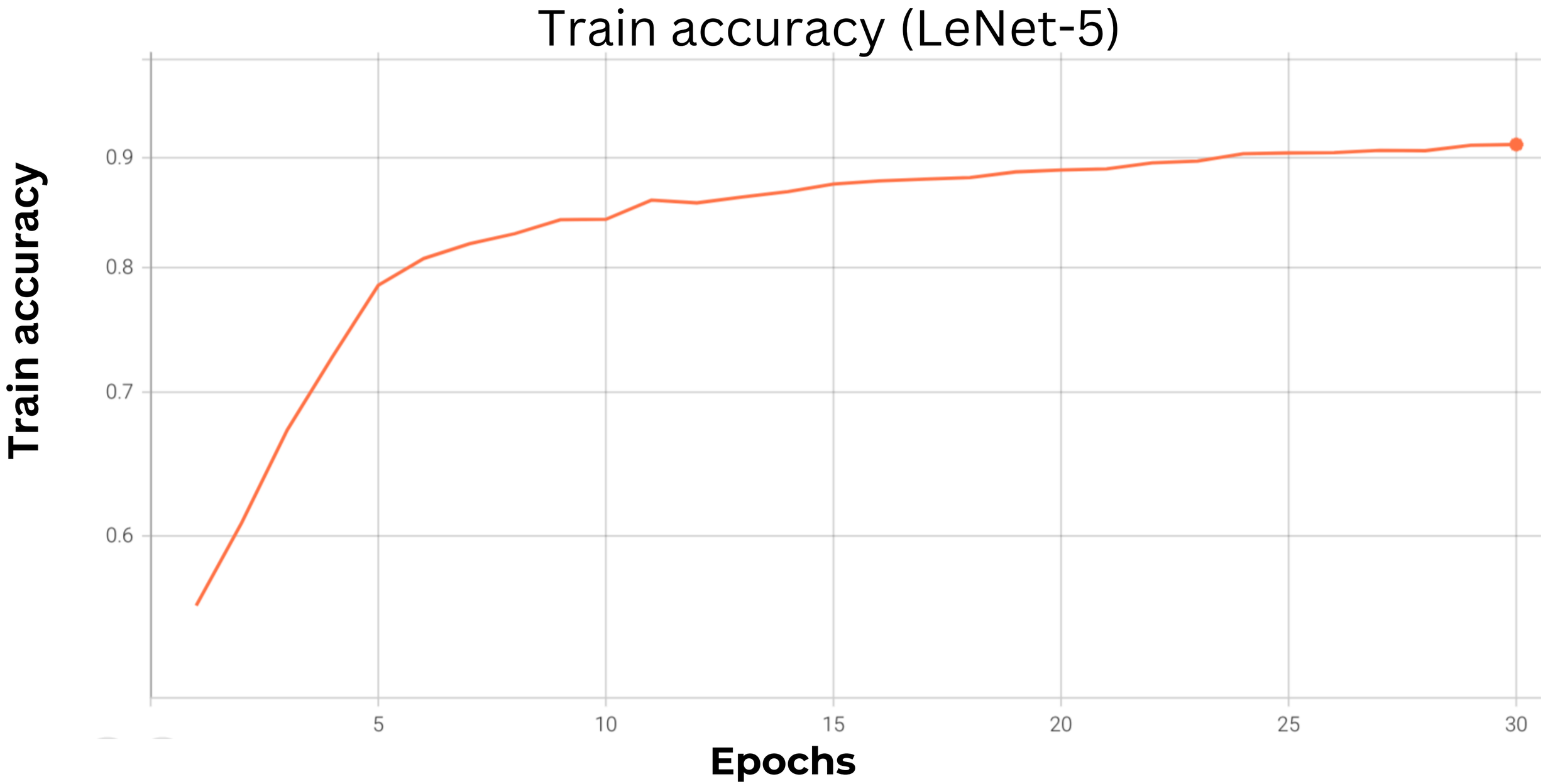
GENKI 4K Dataset

This is the **GENKI 4K** dataset, collected by the *Machine Perception Laboratory, University of California*, San Diego. This dataset contains **4000 images** along with expression (**smile=1, non-smile=0**) labels and pose labels (yaw, pitch, and roll, in radians).

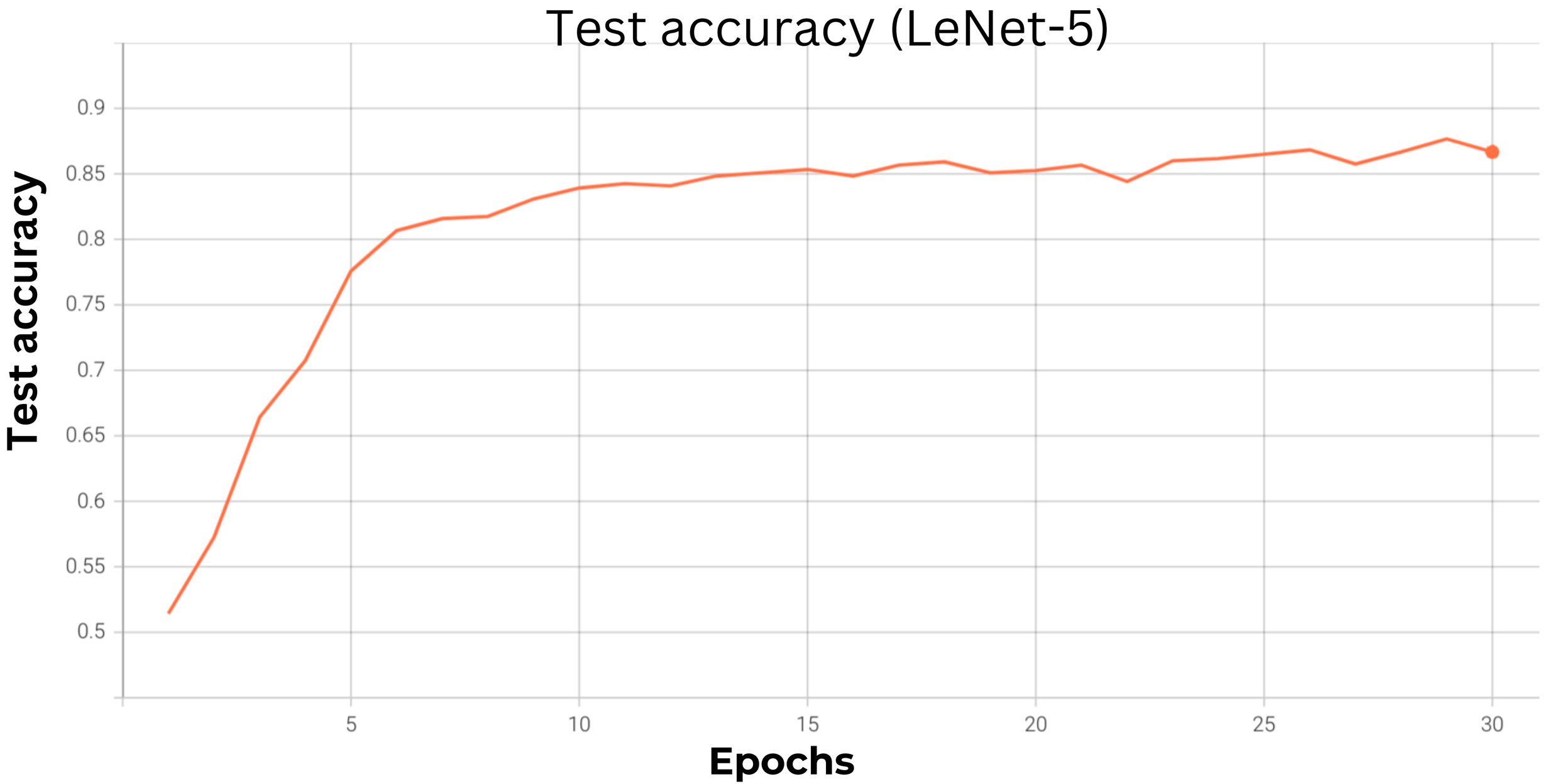
LeNet-5


CONV
5 x 5
s = 1
Avg
pool
f = 2
s = 2
CONV
5 x 5
s = 1
Avg
pool
f = 2
s = 2
CONV
FC
FC
ŷ
32 x 32 x 1
28 x 28 x 6
14 x 14 x 6
10 x 10 x 16
5 x 5 x 16
120
84
10

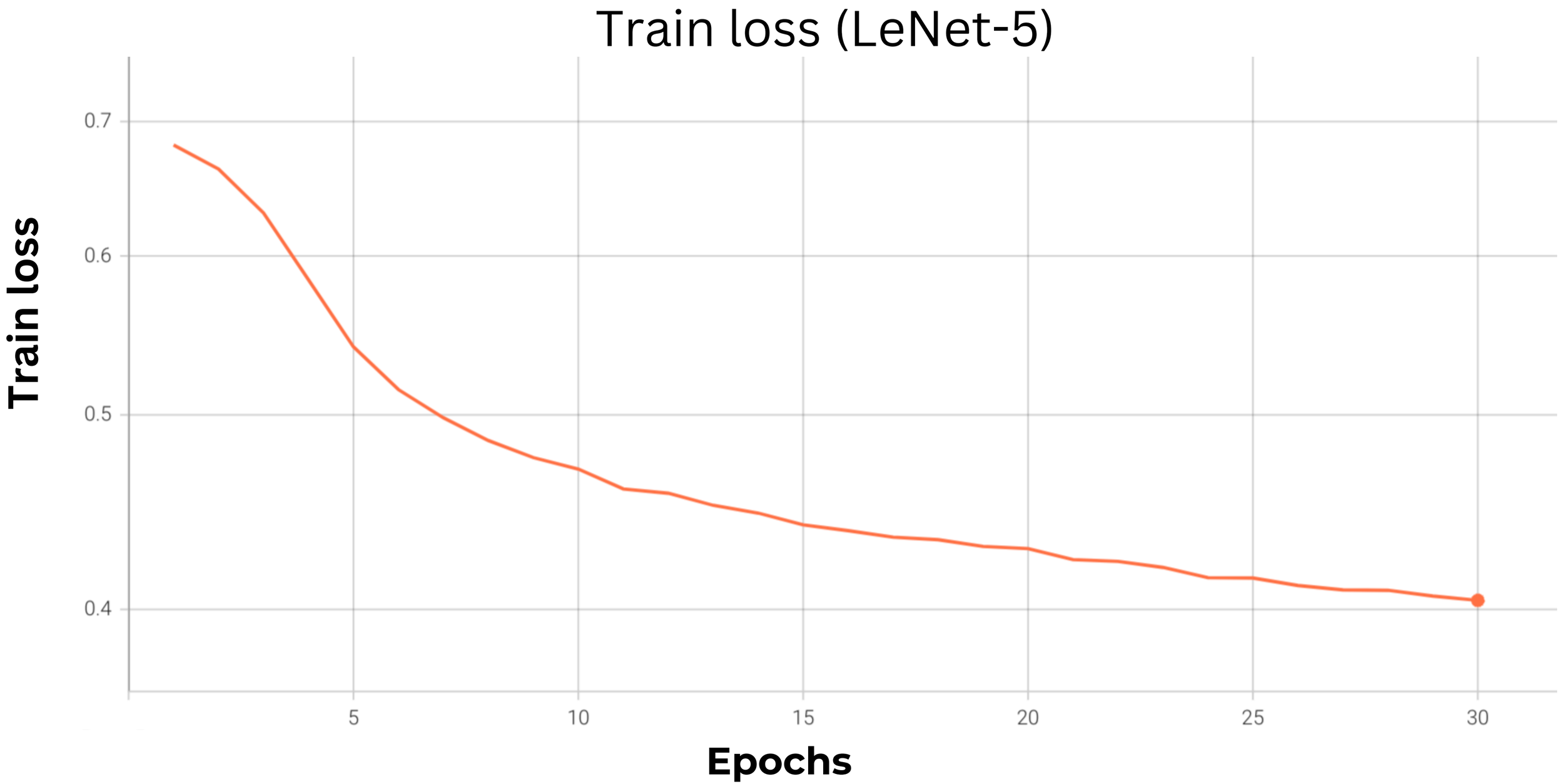
The Train Accuracy is 0.9129



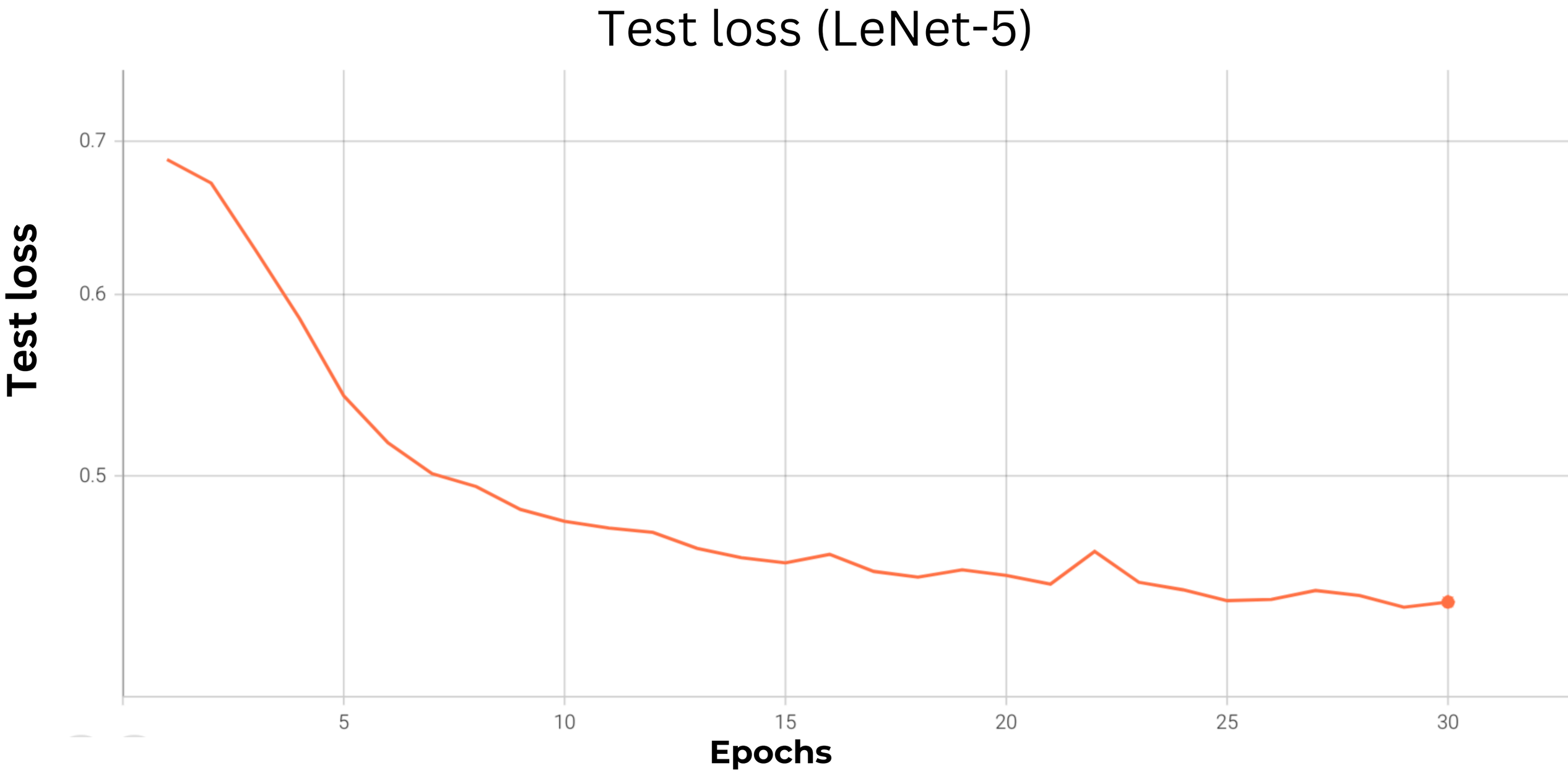
The Test Accuracy is 0.8667



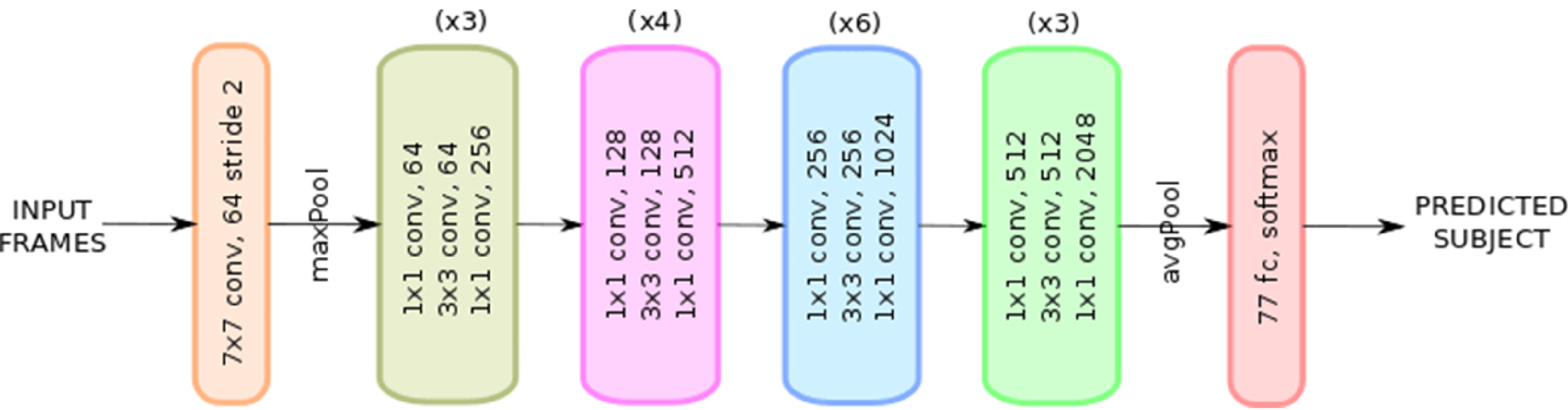
The Train Loss is 0.4042 (for the last epoch)



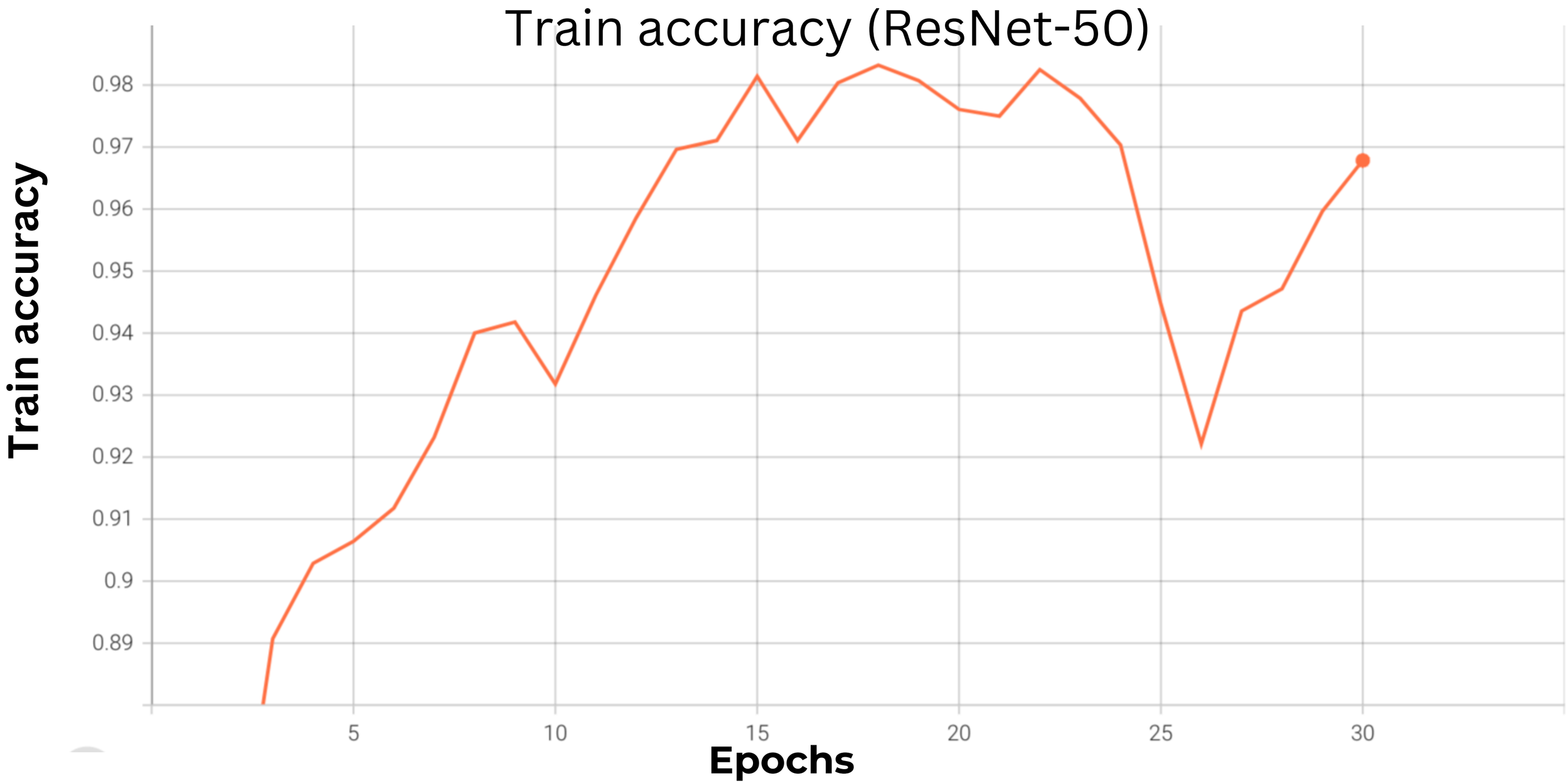
The Last Test Loss is 0.4404



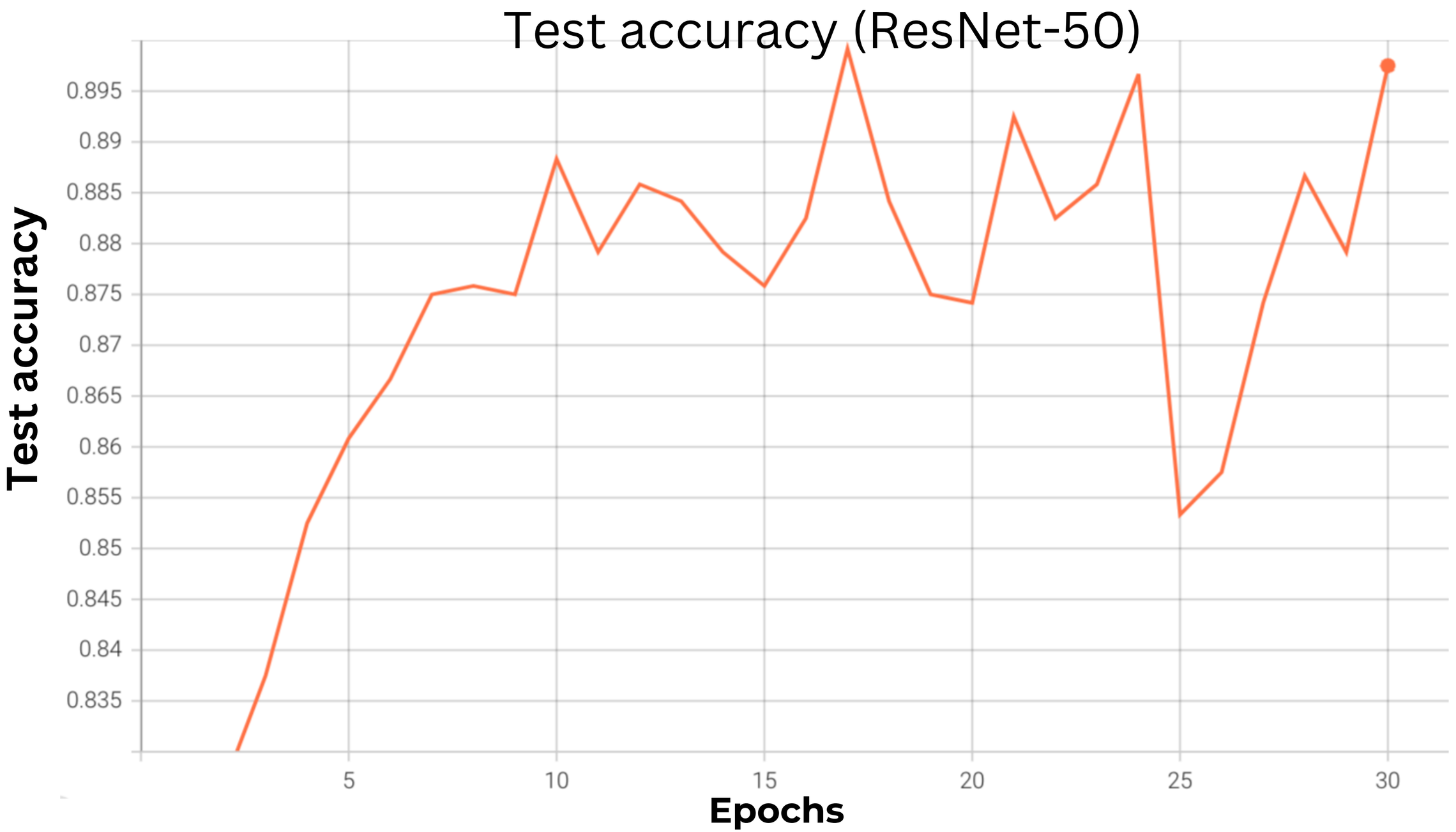
ResNet-50


INPUT FRAMES
7x7 conv, 64 stride 2
maxPool
(x3)
1x1 conv, 64
3x3 conv, 64
1x1 conv, 256
(x4)
1x1 conv, 128
3x3 conv, 128
1x1 conv, 512
(x6)
1x1 conv, 256
3x3 conv, 256
1x1 conv, 1024
(x3)
1x1 conv, 512
3x3 conv, 512
1x1 conv, 2048
avgPool
77 fc, softmax
PREDICTED SUBJECT

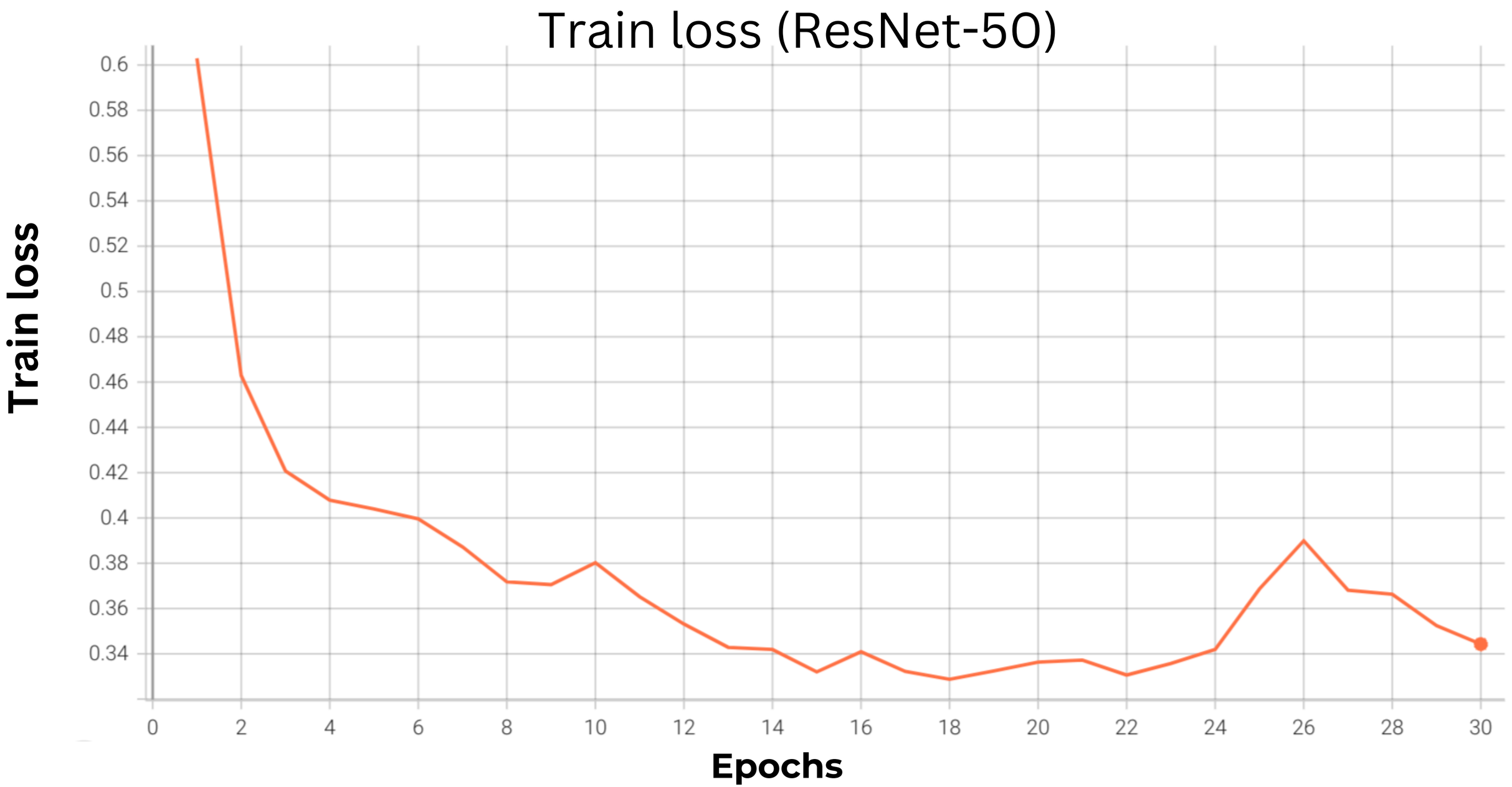
The Train Accuracy is 0.9679



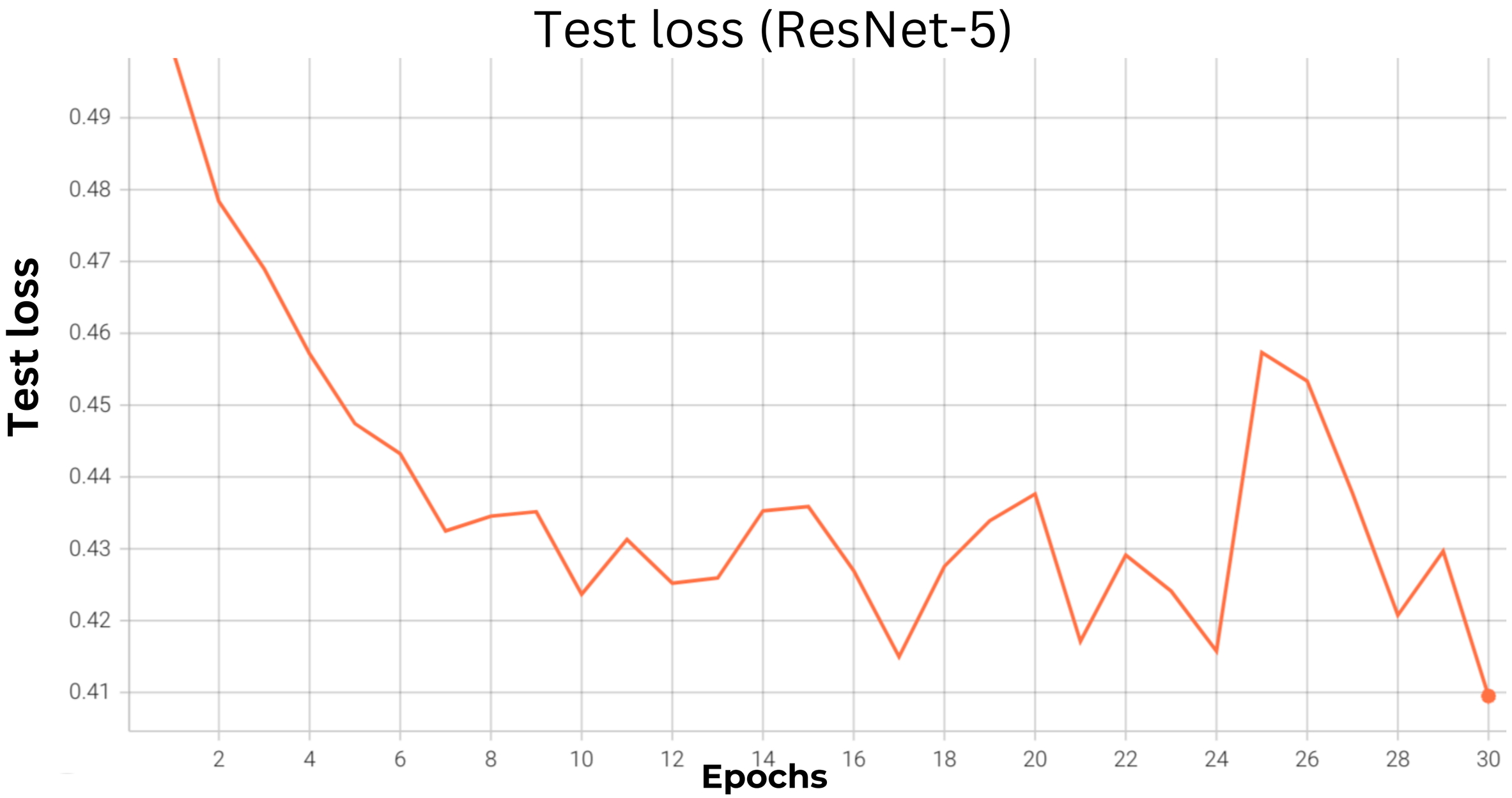
The Test Accuracy is 0.8975



The Train Loss is 0.3443 (for the last epoch)



The Test Loss is 0.4095 (for the last epoch)



Self-Attention layer

Query

Input 24 channels
Output 12 channels

Convolution
Kernel 1 x 1
Stride = 1

Key

Input 24 channels
Output 12 channels

Convolution
Kernel 1 x 1
Stride = 1

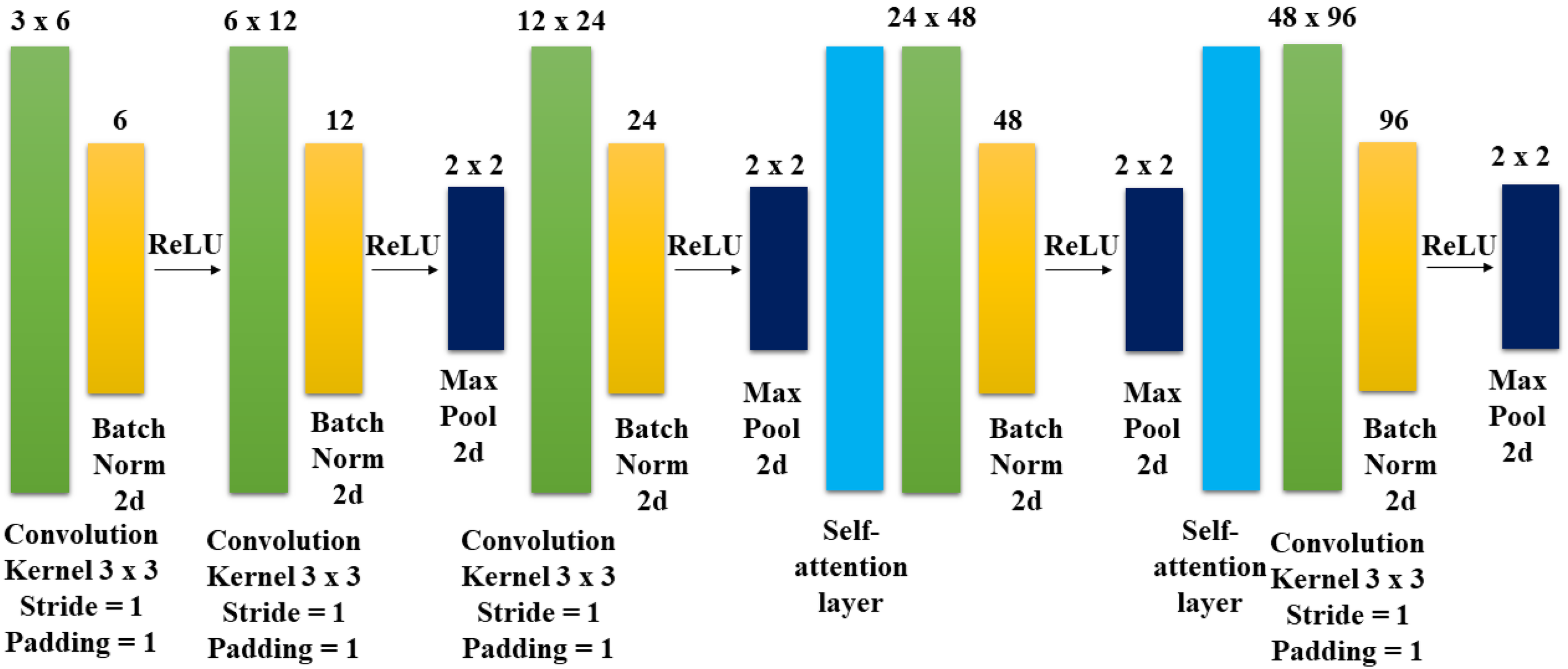
Value

Input 24 channels
Output 12 channels

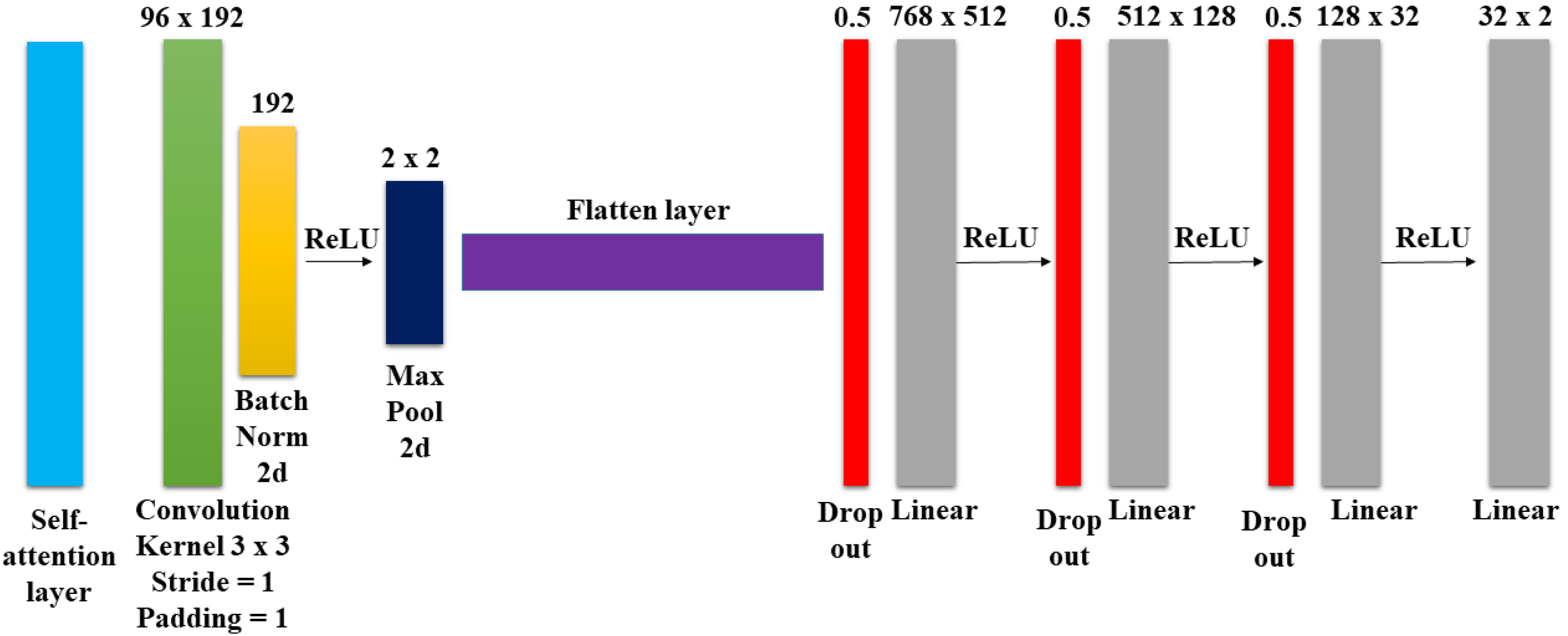
Convolution
Kernel 1 x 1
Stride = 1

Softmax

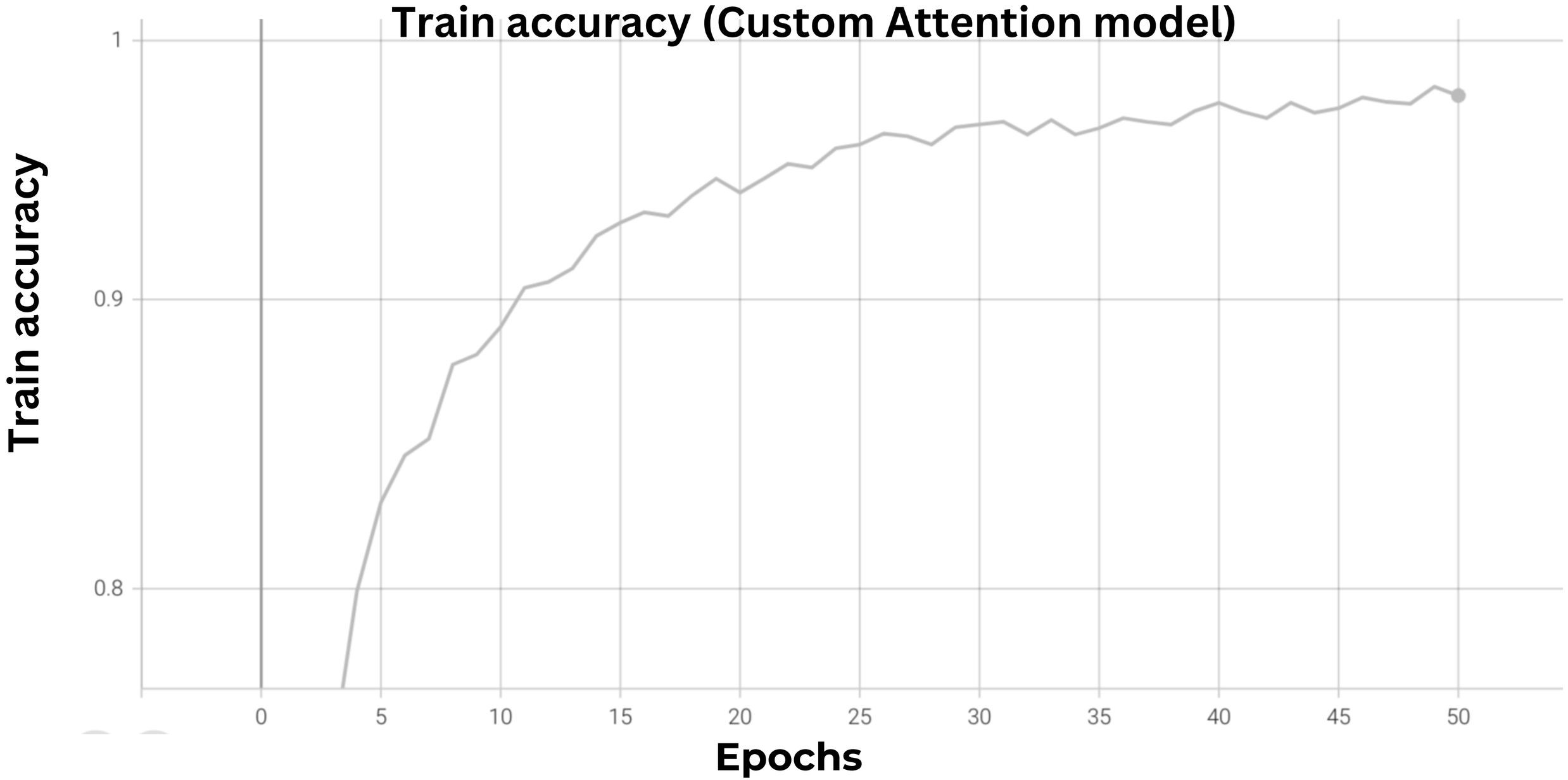
Self-Attention based model



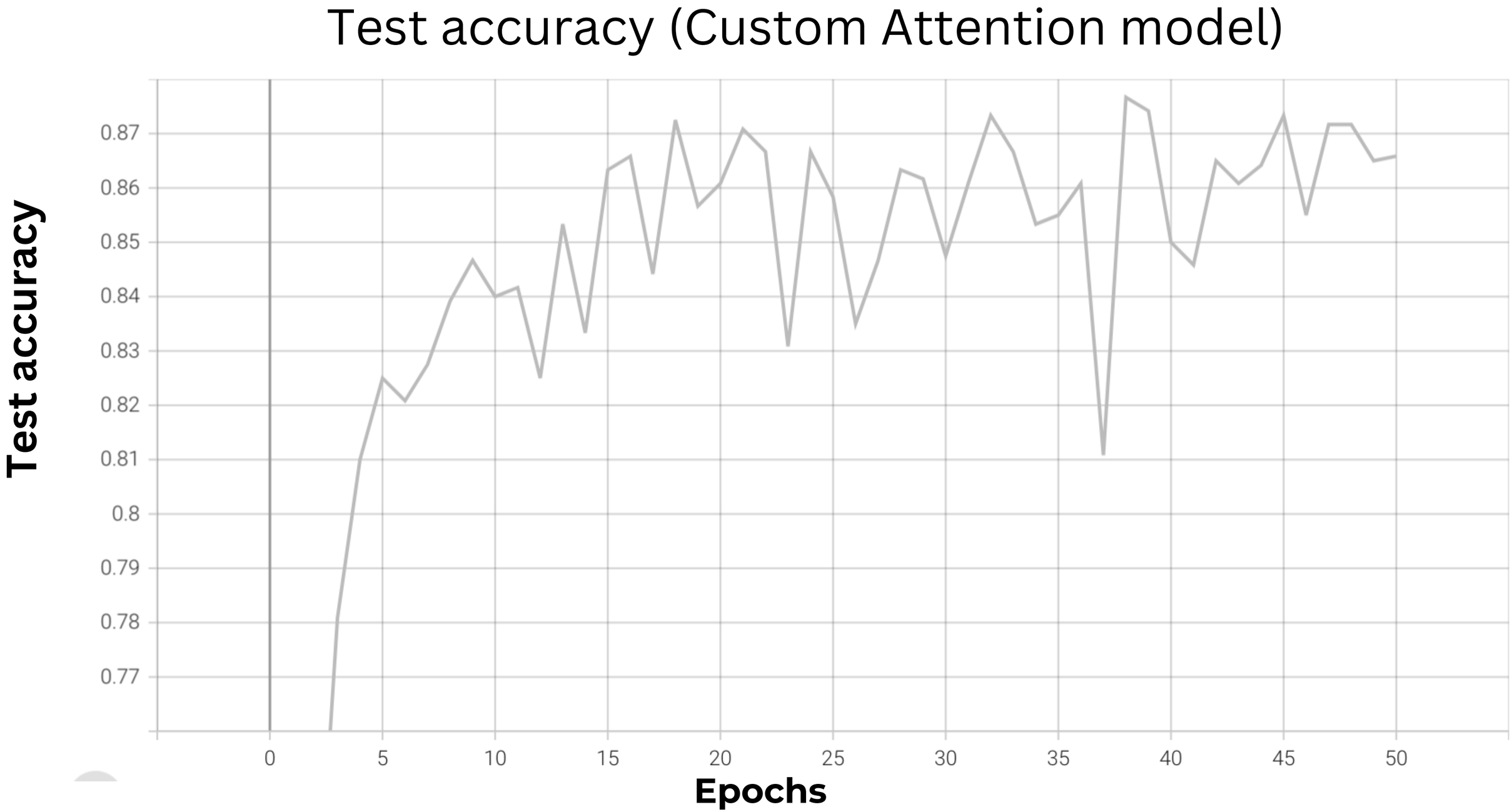
Self-Attention based model



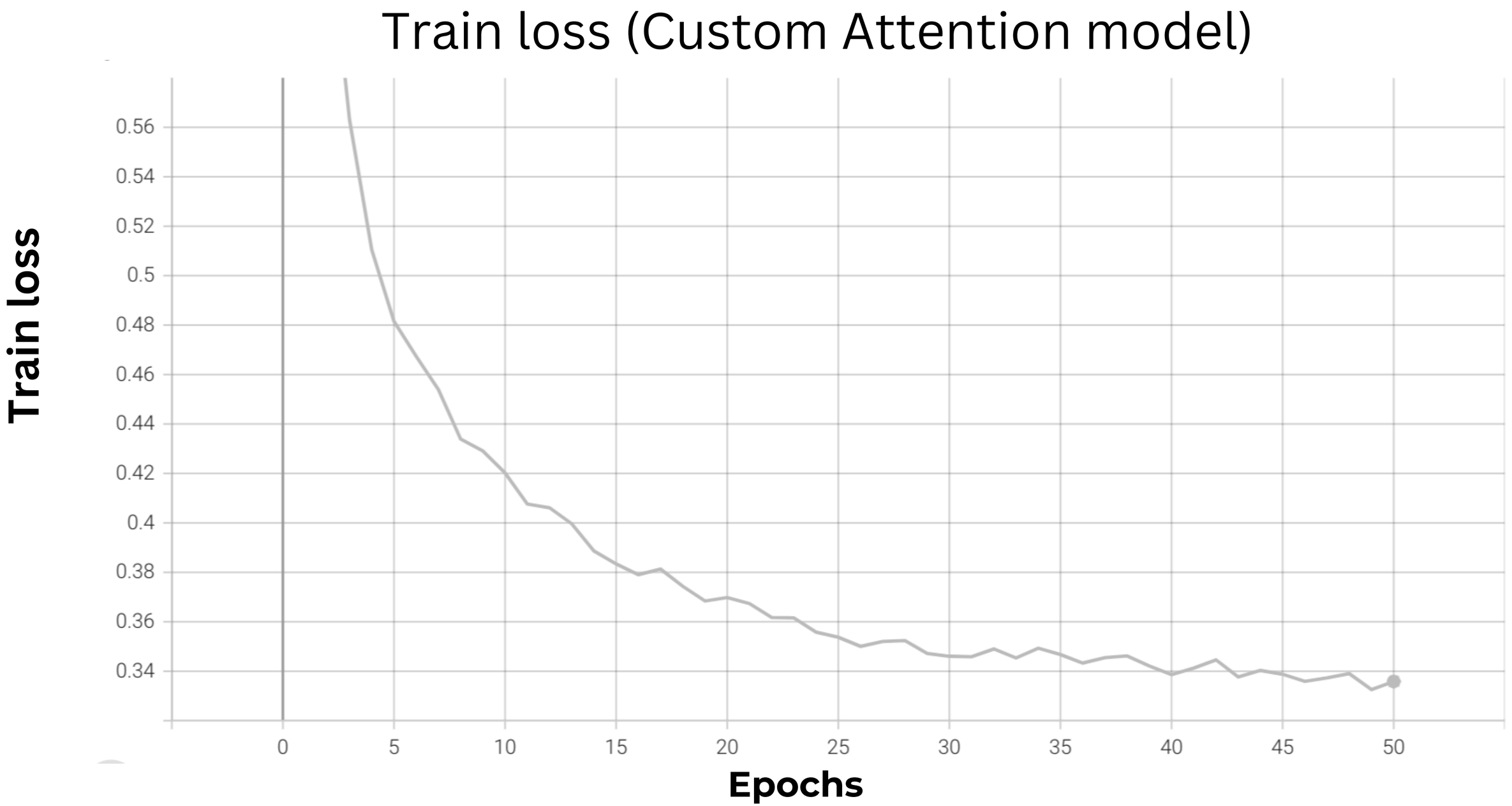
The Train Accuracy is 0.99779



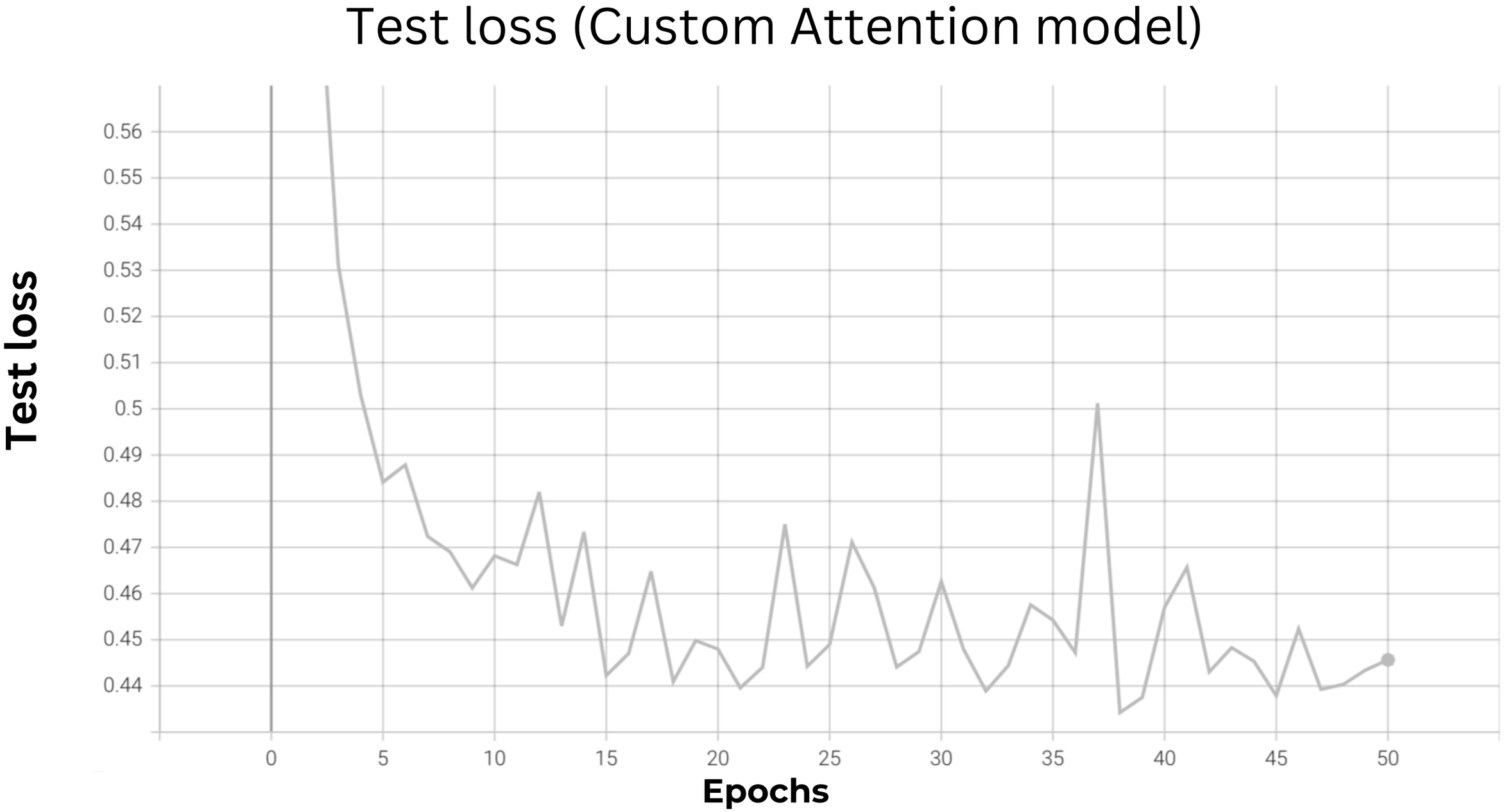
The Test Accuracy is 0.8658



The Train Loss is 0.3359 (for the last epoch)

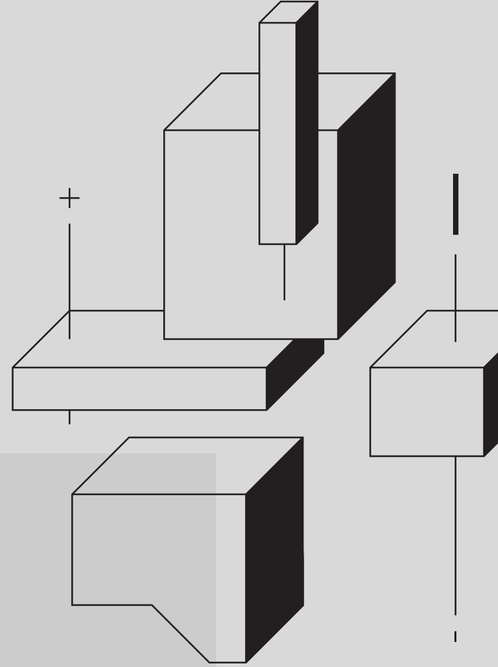


The Test Loss is 0.4456 (for the last epoch)



Summary Table

Model	Training Accuracy	Training Loss	Test Accuracy	Test Loss	Training Time	Complexity
LeNET-5	0.9129	0.4042	0.8667	0.4404	12m 55s	Low
Custom Attention Model	0.9779	0.3359	0.8658	0.4456	32m 43s	Medium
ResNet50	0.9679	0.3443	0.8975	0.4095	1h 22m 23s	High



Thank You
For Your Attention :)