LAB Logbook

Lab 1

A graph with red dots and a blue line

Description automatically generated

Lab 2

A graph showing a curve

Description automatically generated with medium confidence**accuracy :0.89**

Lab 3

**Model: "sequential"**

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━┓

┃ **Layer (type)** ┃ **Output Shape** ┃ **Param #** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━┩

│ flatten (Flatten) │ (None, 784) │ 0 │

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│ dense (Dense) │ (None, 80) │ 62,800 │

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│ dense\_1 (Dense) │ (None, 40) │ 3,240 │

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│ dense\_2 (Dense) │ (None, 20) │ 820 │

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│ dense\_3 (Dense) │ (None, 10) │ 210 │

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**Total params:** 67,070 (261.99 KB)

**Trainable params:** 67,070 (261.99 KB)

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

None

A graph with blue dots

AI-generated content may be incorrect.

**accuracy : 0.8898000121116638**

Lab 4

**Model: "sequential\_2"**

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━┓

┃ **Layer (type)** ┃ **Output Shape** ┃ **Param #** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━┩

│ dense\_6 (Dense) │ (None, 152) │ 3,040 │

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│ dense\_7 (Dense) │ (None, 64) │ 9,792 │

├─────────────────────────────────┼────────────────────────┼───────────────┤

│ dense\_8 (Dense) │ (None, 32) │ 2,080 │

├─────────────────────────────────┼────────────────────────┼───────────────┤

│ dense\_9 (Dense) │ (None, 1) │ 33 │

└─────────────────────────────────┴────────────────────────┴───────────────┘

**Total params:** 14,945 (58.38 KB)

**Trainable params:** 14,945 (58.38 KB)

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

None

A graph with blue dots

AI-generated content may be incorrect.

**absolute prediction error = 68057.0 $**

**relative prediction error = 30.670121676430824 %**

Lab 5

A screenshot of a table

AI-generated content may be incorrect.

A line graph with blue dots

AI-generated content may be incorrect.

**Epochs : 30**

Lab 6

A screenshot of a white sheet

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

A graph with blue lines and dots

AI-generated content may be incorrect.

Epochs = 13

Lab 7

A graph of a graph

AI-generated content may be incorrect.A graph of a line

AI-generated content may be incorrect.

Epochs = 40

A screenshot of a graph

AI-generated content may be incorrect.

A colorful bar graph

AI-generated content may be incorrect.

Lab 8

A screenshot of a computer

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

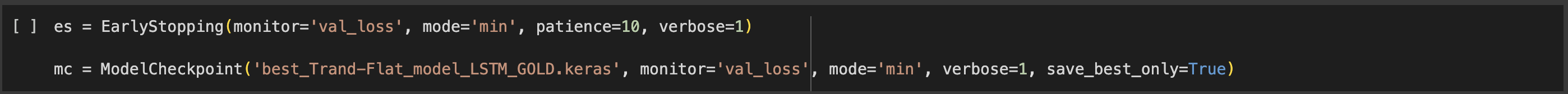
A screenshot of a calculator

AI-generated content may be incorrect.

A graph with lines and dots

AI-generated content may be incorrect.

Lab 9



A screenshot of a computer

AI-generated content may be incorrect.

A screenshot of a computer screen

AI-generated content may be incorrect.

A graph with blue and green lines

AI-generated content may be incorrect.

Lab 10

A screenshot of a table

AI-generated content may be incorrect.

A table with numbers and a number of objects

AI-generated content may be incorrect.

A screenshot of a graph

AI-generated content may be incorrect.

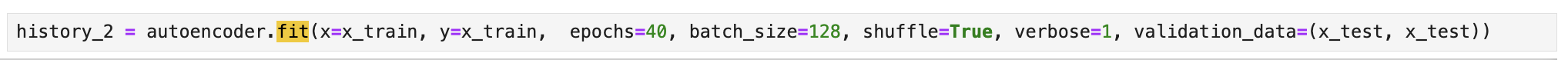
2.

A screenshot of a computer

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.



A graph with blue dots

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

Lab 11

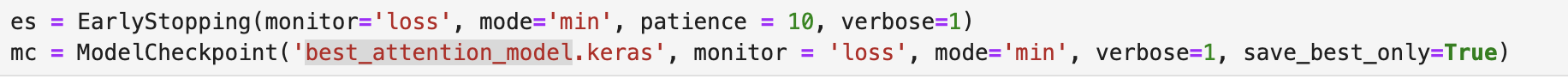
A screenshot of a computer

AI-generated content may be incorrect.

Lab 12

A screenshot of a math problem

AI-generated content may be incorrect.





Epoch 1/50

**818/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 740us/step - loss: 4.5794e-05

Epoch 1: loss improved from inf to 0.00006, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 772us/step - loss: 4.5973e-05

Epoch 2/50

**822/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 797us/step - loss: 1.4782e-04

Epoch 2: loss improved from 0.00006 to 0.00006, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 815us/step - loss: 1.4727e-04

Epoch 3/50

**767/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 723us/step - loss: 7.1076e-05

Epoch 3: loss improved from 0.00006 to 0.00006, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 739us/step - loss: 7.0240e-05

Epoch 4/50

**769/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 721us/step - loss: 1.8145e-05

Epoch 4: loss improved from 0.00006 to 0.00006, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 737us/step - loss: 2.0917e-05

Epoch 5/50

**811/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 746us/step - loss: 2.5223e-05

Epoch 5: loss improved from 0.00006 to 0.00005, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 763us/step - loss: 2.5764e-05

Epoch 6/50

**787/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 846us/step - loss: 7.7756e-05

Epoch 6: loss improved from 0.00005 to 0.00005, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 856us/step - loss: 7.6459e-05

Epoch 7/50

**779/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 714us/step - loss: 1.0803e-04

Epoch 7: loss improved from 0.00005 to 0.00005, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 729us/step - loss: 1.0459e-04

Epoch 8/50

**762/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 726us/step - loss: 6.6789e-05

Epoch 8: loss improved from 0.00005 to 0.00005, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 742us/step - loss: 6.5381e-05

Epoch 9/50

**781/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 711us/step - loss: 2.3014e-05

Epoch 9: loss improved from 0.00005 to 0.00005, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 727us/step - loss: 2.4413e-05

Epoch 10/50

**764/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 725us/step - loss: 1.2452e-05

Epoch 10: loss improved from 0.00005 to 0.00004, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 740us/step - loss: 1.4877e-05

Epoch 11/50

**780/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 711us/step - loss: 1.8869e-05

Epoch 11: loss did not improve from 0.00004

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 722us/step - loss: 2.0307e-05

Epoch 12/50

**766/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 724us/step - loss: 1.8489e-05

Epoch 12: loss improved from 0.00004 to 0.00004, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 739us/step - loss: 2.0234e-05

Epoch 13/50

**826/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 732us/step - loss: 7.2210e-06

Epoch 13: loss improved from 0.00004 to 0.00004, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 749us/step - loss: 7.2610e-06

Epoch 14/50

**770/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 719us/step - loss: 1.1731e-05

Epoch 14: loss improved from 0.00004 to 0.00004, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 737us/step - loss: 1.3656e-05

Epoch 15/50

**759/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 732us/step - loss: 4.0789e-05

Epoch 15: loss improved from 0.00004 to 0.00004, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 753us/step - loss: 4.0565e-05

Epoch 16/50

**820/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 738us/step - loss: 1.7748e-05

Epoch 16: loss did not improve from 0.00004

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 746us/step - loss: 1.7909e-05

Epoch 17/50

**806/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 815us/step - loss: 5.6151e-05

Epoch 17: loss improved from 0.00004 to 0.00003, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 829us/step - loss: 5.5606e-05

Epoch 18/50

**759/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 731us/step - loss: 3.7657e-05

Epoch 18: loss improved from 0.00003 to 0.00003, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 747us/step - loss: 3.7336e-05

Epoch 19/50

**776/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 715us/step - loss: 1.2088e-05

Epoch 19: loss did not improve from 0.00003

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 722us/step - loss: 1.2998e-05

Epoch 20/50

**781/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 712us/step - loss: 9.6185e-05

Epoch 20: loss improved from 0.00003 to 0.00003, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 728us/step - loss: 9.2622e-05

Epoch 21/50

**776/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 716us/step - loss: 1.7927e-05

Epoch 21: loss improved from 0.00003 to 0.00003, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 738us/step - loss: 1.8704e-05

Epoch 22/50

**766/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 725us/step - loss: 2.1743e-05

Epoch 22: loss improved from 0.00003 to 0.00003, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 740us/step - loss: 2.2345e-05

Epoch 23/50

**769/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 720us/step - loss: 1.2738e-05

Epoch 23: loss improved from 0.00003 to 0.00003, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 737us/step - loss: 1.3849e-05

Epoch 24/50

**825/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 734us/step - loss: 1.3513e-05

Epoch 24: loss did not improve from 0.00003

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 741us/step - loss: 1.3549e-05

Epoch 25/50

**791/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 834us/step - loss: 1.6907e-05

Epoch 25: loss improved from 0.00003 to 0.00002, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 852us/step - loss: 1.7221e-05

Epoch 26/50

**758/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 732us/step - loss: 3.2044e-05

Epoch 26: loss did not improve from 0.00002

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 738us/step - loss: 3.1472e-05

Epoch 27/50

**779/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 713us/step - loss: 1.4976e-06

Epoch 27: loss did not improve from 0.00002

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 725us/step - loss: 2.8314e-06

Epoch 28/50

**779/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 712us/step - loss: 6.8779e-05

Epoch 28: loss improved from 0.00002 to 0.00002, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 732us/step - loss: 6.5922e-05

Epoch 29/50

**773/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 717us/step - loss: 3.3943e-05

Epoch 29: loss did not improve from 0.00002

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 729us/step - loss: 3.3300e-05

Epoch 30/50

**768/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 723us/step - loss: 1.4766e-05

Epoch 30: loss improved from 0.00002 to 0.00002, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 738us/step - loss: 1.5226e-05

Epoch 31/50

**763/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 726us/step - loss: 2.5979e-05

Epoch 31: loss did not improve from 0.00002

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 733us/step - loss: 2.5910e-05

Epoch 32/50

**769/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 723us/step - loss: 2.3093e-05

Epoch 32: loss improved from 0.00002 to 0.00002, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 740us/step - loss: 2.2854e-05

Epoch 33/50

**814/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 744us/step - loss: 4.1987e-06

Epoch 33: loss did not improve from 0.00002

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 757us/step - loss: 4.4393e-06

Epoch 34/50

**770/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 920us/step - loss: 8.7023e-06

Epoch 34: loss did not improve from 0.00002

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 919us/step - loss: 9.5372e-06

Epoch 35/50

**781/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 862us/step - loss: 5.7682e-06

Epoch 35: loss did not improve from 0.00002

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 865us/step - loss: 6.5490e-06

Epoch 36/50

**767/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 724us/step - loss: 3.3223e-05

Epoch 36: loss improved from 0.00002 to 0.00002, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 749us/step - loss: 3.2224e-05

Epoch 37/50

**758/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 732us/step - loss: 1.9485e-05

Epoch 37: loss improved from 0.00002 to 0.00002, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 747us/step - loss: 1.9025e-05

Epoch 38/50

**767/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 724us/step - loss: 1.1099e-05

Epoch 38: loss did not improve from 0.00002

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 729us/step - loss: 1.1549e-05

Epoch 39/50

**773/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 716us/step - loss: 4.5164e-06

Epoch 39: loss improved from 0.00002 to 0.00001, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 735us/step - loss: 5.2010e-06

Epoch 40/50

**817/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 739us/step - loss: 1.6091e-05

Epoch 40: loss did not improve from 0.00001

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 747us/step - loss: 1.6088e-05

Epoch 41/50

**821/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 738us/step - loss: 3.4714e-06

Epoch 41: loss did not improve from 0.00001

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 745us/step - loss: 3.5621e-06

Epoch 42/50

**805/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 815us/step - loss: 1.7484e-05

Epoch 42: loss did not improve from 0.00001

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 820us/step - loss: 1.7438e-05

Epoch 43/50

**823/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 736us/step - loss: 1.7616e-05

Epoch 43: loss did not improve from 0.00001

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 744us/step - loss: 1.7624e-05

Epoch 44/50

**780/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 710us/step - loss: 8.6025e-06

Epoch 44: loss did not improve from 0.00001

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 717us/step - loss: 9.0787e-06

Epoch 45/50

**818/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 866us/step - loss: 1.5601e-05

Epoch 45: loss improved from 0.00001 to 0.00001, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 899us/step - loss: 1.5570e-05

Epoch 46/50

**792/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 764us/step - loss: 2.0119e-05

Epoch 46: loss did not improve from 0.00001

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 771us/step - loss: 2.0040e-05

Epoch 47/50

**787/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 768us/step - loss: 1.2677e-05

Epoch 47: loss improved from 0.00001 to 0.00001, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 785us/step - loss: 1.2649e-05

Epoch 48/50

**780/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 775us/step - loss: 1.0866e-05

Epoch 48: loss did not improve from 0.00001

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 781us/step - loss: 1.1077e-05

Epoch 49/50

**813/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 744us/step - loss: 3.3978e-05

Epoch 49: loss did not improve from 0.00001

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 752us/step - loss: 3.3608e-05

Epoch 50/50

**772/826** ━━━━━━━━━━━━━━━━━━━━ **0s** 785us/step - loss: 8.5217e-06

Epoch 50: loss improved from 0.00001 to 0.00001, saving model to best\_attention\_model.keras

**826/826** ━━━━━━━━━━━━━━━━━━━━ **1s** 801us/step - loss: 8.7484e-06

[100]:

A screenshot of a computer

AI-generated content may be incorrect.

A graph of a number of dots

AI-generated content may be incorrect.

A graph with blue and orange bars

AI-generated content may be incorrect.