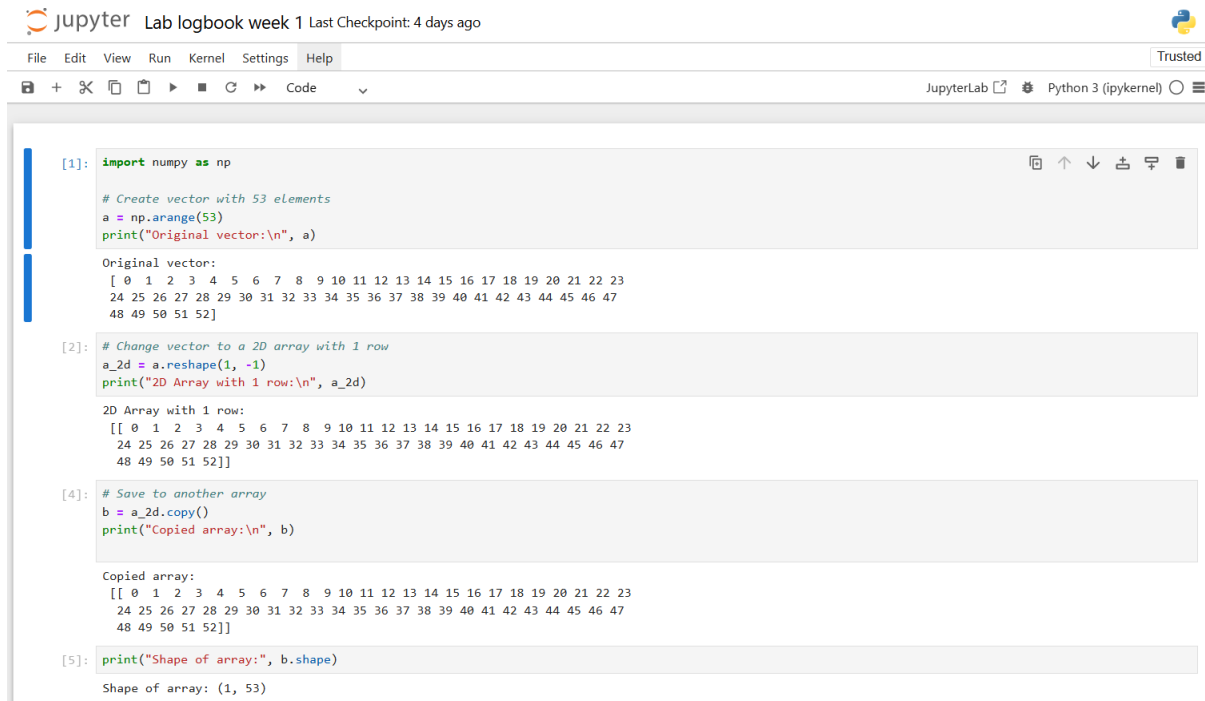


# LAB Logbook

## Lab 1



JupyterLab Lab logbook week 1 Last Checkpoint: 4 days ago

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JupyterLab Python 3 (ipykernel)

```
[1]: import numpy as np

# Create vector with 53 elements
a = np.arange(53)
print("Original vector:\n", a)

Original vector:
[ 0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
 48 49 50 51 52]

[2]: # Change vector to a 2D array with 1 row
a_2d = a.reshape(1, -1)
print("2D Array with 1 row:\n", a_2d)

2D Array with 1 row:
[[ 0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
 48 49 50 51 52]]

[4]: # Save to another array
b = a_2d.copy()
print("Copied array:\n", b)

Copied array:
[[ 0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
 48 49 50 51 52]]

[5]: print("Shape of array:", b.shape)

Shape of array: (1, 53)
```

## Lab 2

## Lab 3

## Lab 4

Lab MLP architecture (SID 2317053):

Model: "sequential"

Layer (type)	Output Shape	Param #
dense (Dense)	(None, 53)	26,553
dense_1 (Dense)	(None, 26)	1,404
dense_2 (Dense)	(None, 1)	27

Total params: 27,984 (109.31 KB)

Trainable params: 27,984 (109.31 KB)

Non-trainable params: 0 (0.00 B)

```
[5]: # Train the model (epochs = 10)
history_lab = lab_model.fit(X_train, y_train, batch_size=10, epochs=10, validation_split=0.2, verbose=1)

# Evaluate on test set and print MAE (scaled units)
mse_lab, mae_lab = lab_model.evaluate(X_test, y_test, verbose=0)
print('\nLab model test MAE (scaled):', mae_lab)
print('Lab model test MSE (scaled):', mse_lab)

# For comparison: if you have the practical-session MLP MAE (scaled) from the session, print it here.
practical_session_mae = 0.05292 # replace if you have a different value
print('\nPractical session MLP test MAE (reported):', practical_session_mae)
print('Difference (lab - practical):', mae_lab - practical_session_mae)
```

```
Epoch 1/10
2640/2640 ————— 4s 1ms/step - loss: 5.9491e-04 - mae: 0.0147 - val_loss: 0.0059 - val_mae: 0.0096
Epoch 2/10
2640/2640 ————— 3s 1ms/step - loss: 1.1717e-04 - mae: 0.0083 - val_loss: 0.0034 - val_mae: 0.0053
Epoch 3/10
2640/2640 ————— 3s 1ms/step - loss: 8.6730e-05 - mae: 0.0072 - val_loss: 0.0010 - val_mae: 0.0028
Epoch 4/10
2640/2640 ————— 3s 1ms/step - loss: 8.0475e-05 - mae: 0.0068 - val_loss: 0.0014 - val_mae: 0.0034
Epoch 5/10
2640/2640 ————— 3s 1ms/step - loss: 6.9877e-05 - mae: 0.0063 - val_loss: 0.0011 - val_mae: 0.0029
Epoch 6/10
2640/2640 ————— 3s 1ms/step - loss: 6.3635e-05 - mae: 0.0061 - val_loss: 5.9511e-04 - val_mae: 0.0020
Epoch 7/10
2640/2640 ————— 3s 1ms/step - loss: 5.9160e-05 - mae: 0.0059 - val_loss: 6.8608e-04 - val_mae: 0.0022
Epoch 8/10
2640/2640 ————— 3s 1ms/step - loss: 5.5622e-05 - mae: 0.0057 - val_loss: 4.2178e-04 - val_mae: 0.0017
Epoch 9/10
2640/2640 ————— 3s 1ms/step - loss: 5.1369e-05 - mae: 0.0054 - val_loss: 3.9681e-04 - val_mae: 0.0016
Epoch 10/10
2640/2640 ————— 3s 1ms/step - loss: 4.9476e-05 - mae: 0.0053 - val_loss: 3.0102e-04 - val_mae: 0.0013
```

```
Lab model test MAE (scaled): 0.024312620982527733
Lab model test MSE (scaled): 0.0008323349175043404
```

```
Practical session MLP test MAE (reported): 0.05292
Difference (lab - practical): -0.02860737901747227
```

## Lab 5

Lab 6

Lab 7

Lab 8

Lab 9

Lab 10

Lab 11

Lab 12