

# VISUAL APPLICATION OF ML

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## EXERCISE 2-5

### 2.5.1 Handwritten number recognition:

The accuracy of the hand written numbers was 70%. The model got 6, 8 and 9 wrong.

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[101]: # Calculate accuracy

from sklearn.metrics import accuracy_score

accuracy = accuracy_score(y_real_test, predicted_labels)
print(f"Model accuracy on handwritten data: {accuracy * 100:.2f}%")

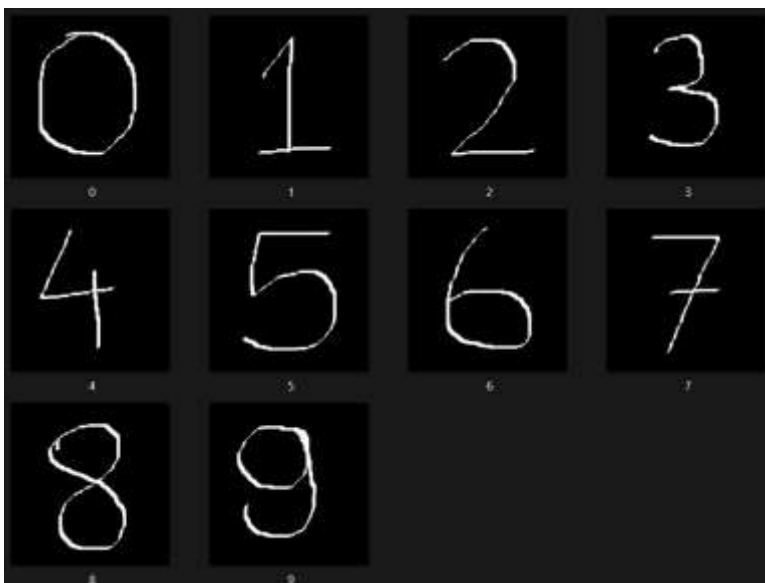
Model accuracy on handwritten data: 70.00%

[102]: # Display the predicted and true labels

for i, (pred, actual) in enumerate(zip(predicted_labels, y_real_test)):
    print(f"Image {i}: Predicted = {pred}, Actual = {actual}")

Image 0: Predicted = 0, Actual = 0
Image 1: Predicted = 1, Actual = 1
Image 2: Predicted = 2, Actual = 2
Image 3: Predicted = 3, Actual = 3
Image 4: Predicted = 4, Actual = 4
Image 5: Predicted = 5, Actual = 5
Image 6: Predicted = 5, Actual = 6
Image 7: Predicted = 7, Actual = 7
Image 8: Predicted = 3, Actual = 8
Image 9: Predicted = 3, Actual = 9
```

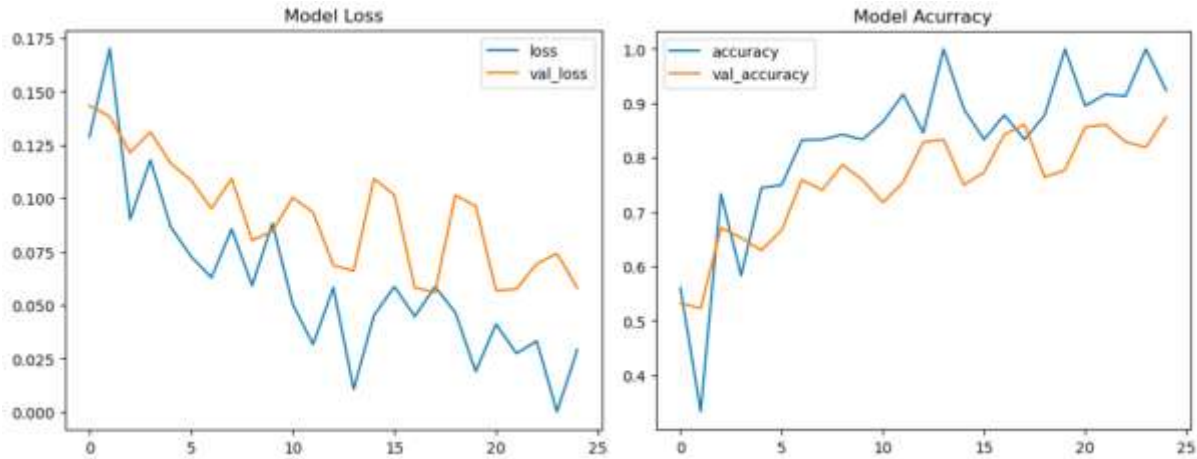
The numbers to recognize were:



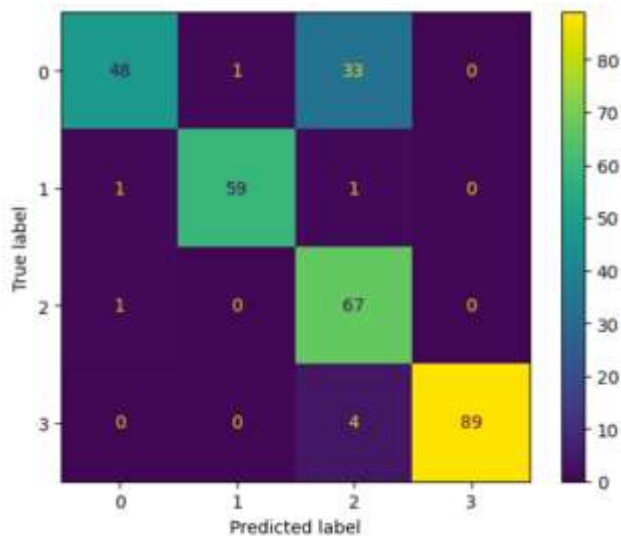
## 2.5.2 RADAR Recognition

Using Epoch of 25 and val\_accuracy of 0.75, accuracy of 92.3% was achieved.

**Accuracy: 0.9235095381736755, Val\_Accuracy: 0.875**  
**Loss: 0.02913747727870941, Val\_Loss: 0.05806592479348183**



Confusion Matrix:



Proposal for the use of GANs in weather prediction:

- GANs could use traffic/surveillance cameras to record weather data.
- GANs could use historic data and compare to current situation to predict the short term weather forecasts
- GANs could be trained to observe polar angular tilt shifts based on fixed camera observations of the position of the sun by comparing it to historical data.