Josh Wattay
Machine Learning with Python
Task 2.5
CareerFoundry

Part 1 – Handwriting Recognition

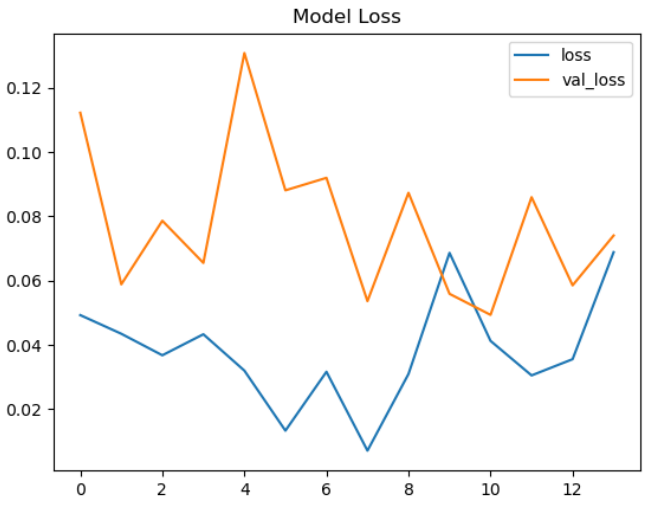
Digit (handwritten by me)	Digit (predicted by model)
0	2
1	2
2	8
3	8
4	8
5	2
6	2
7	8
8	8
9	8

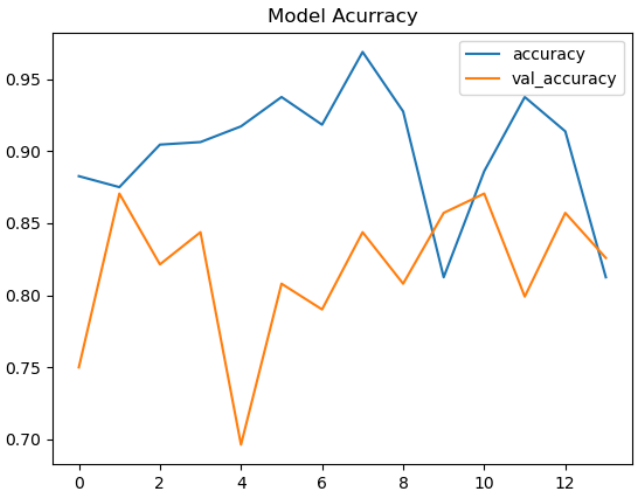
Accuracy was 10%. I believe using a ballpoint pen makes it difficult for the model to discern the white against the black background. Perhaps if the font was thicker the model may have more accuracy. For example, it was able to predict the handwritten digit 7 during the exercise with no problem, but that image has a much bolder font relative to the images of my handwritten digits.

Part 2 – Radar Recognition

28 epochs resulted in the following results:

Accuracy	**0.8125**
Val_Accuracy	**0.8258**
Loss	**0.0688**
Val_Loss	**0.0740**





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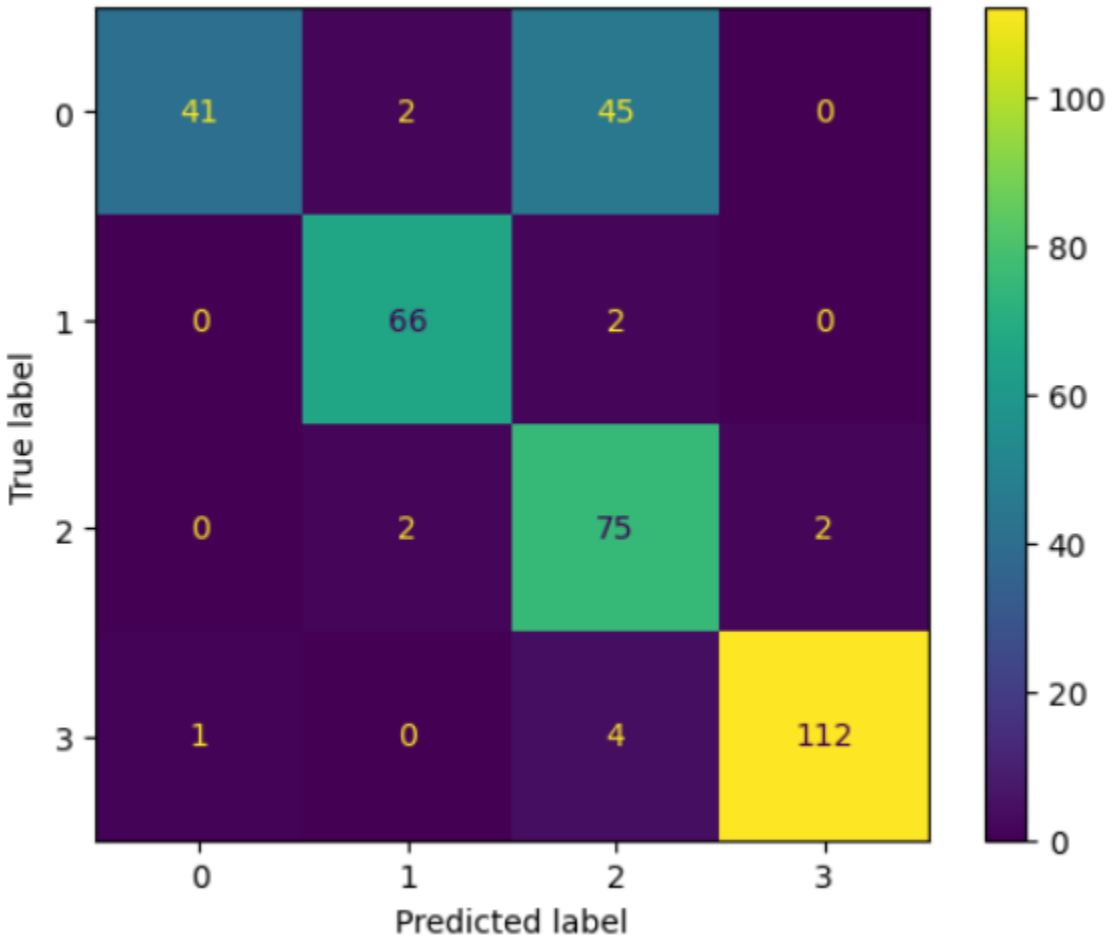

The model accurately classified 15 out of 21 randomly selected photographs. The two incorrect classifications were similar in that the model classified a cloudy photograph as a shine photograph. This distinction appears to be nuanced as the model struggles to discern a cloudy day from a shiny day if there is enough sunlight in the image.

Proposal for the use of GAN's in weather prediction:

If I were to use Generative Adversarial Networks (GANs) for predicting the weather in Europe, I'd focus on creating innovative solutions that bring more accuracy, detail, and insight to forecasting. One approach would be to develop a system that can predict future weather patterns using both current conditions and historical data. By analyzing the changes in weather over time and across regions, this system could generate short-term weather maps that forecast the movement of weather systems—such as cold fronts or storms—across Europe. This would help improve the accuracy of short-term predictions, providing valuable insights for industries that rely on up-to-the-minute weather information.

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Another potential application is in predicting and simulating extreme weather events, such as floods, heatwaves, or storms. Using GANs, we could build a model that simulates these events based on historical trends and climate data. This would allow businesses and governments to assess the likelihood of such events and plan accordingly, potentially preventing damage and saving lives. By generating realistic, synthetic scenarios of extreme weather, we could better prepare for the increasing number of severe weather events that Europe is facing.

Lastly, GANs could be used to enhance the resolution of satellite and radar images, making it easier to spot fine details in weather patterns. Often, weather data comes in lower resolution, which makes it difficult to track localized phenomena like thunderstorms or small-scale precipitation. By enhancing the quality of these images, we could offer more precise forecasts, especially for short-term, localized weather events. This improved data could benefit sectors like agriculture, logistics, and energy, where high accuracy is critical. Together, these three GAN-powered solutions would provide a comprehensive suite of tools to enhance weather forecasting across Europe.