**L05 Image Classification with SVM**

**Reflection on Learning**

Todays lab I trained an SVM to classify images into ten categories: airplanes, cars, birds, cats, deer, dogs, frogs, horses, ships, and trucks. Even though SVMs are a relatively simple model compared to deep learning approaches, they still gave me a good introduction to how image classification works without needing tons of computational power.

**Data Exploration and Preparation**

I loaded the CIFAR-10 dataset directly from TensorFlow, which made it easy to access its 60,000 32x32 color images. Before training the model, You could then visualize some sample images to get a feel for what you’re working with. This helped me understand the variety in the dataset and the challenges that come with trying to classify similar looking categories. We also converted it to greyscale. While this reduced the complexity of the model, it also meant losing color information, which might have been useful in distinguishing certain objects. After that, I split the dataset into training and testing sets, so the model could learn from one part and be evaluated on completely new images.

A screenshot of a computer program

AI-generated content may be incorrect.

**Model Training**

For training, I used the training set and experimented with different kernel functions, including linear, polynomial, and RBF. Each kernel determines how the SVM separates the data, and some worked better than others depending on how complex the patterns were.

**Model Evaluation**

After training, I tested the model by making predictions on the test set. I then measured its accuracy, and while the results were decent, they also showed the limits of using an SVM for image data without additional feature extraction. Looking at the predictions, I saw that the model struggled with certain categories like mistaking cats for dogs which made sense since they have similar shapes and textures in small images.

**Challenges, Reflections and Insights**

One of the biggest challenges was not fully understanding what I was doing at first. Training an SVM on image data was more complicated than I expected, and I had to figure out how to preprocess the images properly. Flattening them made things easier but also removed important details. The model also struggled with certain categories, like confusing cats and dogs, which made me realize why more advanced models are usually needed for image classification. Overall though I knew it was worth it to strengthen my skills, so in the end I figured it was worth it.