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Artificial Intelligence – Computer Vision

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Image Classification with SVM - Reflection

As I continue my journey in artificial intelligence, the topic of today's reflection is Image Classification using the Support Vector Machine, the purpose of this reflection is to understand and learn how to use a basic machine learning algorithm to help with the task of image classification. This will give me the necessary experience and exposure to get familiar and become the foundation for my skills to improve.

We are using a dataset that consists of thousands of pictures of 10 different classes. Airplanes, birds, cars, cats, deer, dogs, frogs, horses, ships, and trucks are the classes. We are going to use this dataset to train the machine learning algorithm (the SVM) to correctly classify the pictures. For a computer to 'see' an image, a process must take place. Images are broken down into pixels in which a computer can analyze individually, it looks for patterns, shapes, and color to understand what the image depicts. Towards the end of the journal, we can see the images converted to a format in which a computer can read. We first see the images in their true original colors, then they are displayed in grayscale, followed by normalized images (scaling pictures to either a 0 or 1). Grayscale images reduce the complexity of the data by using a single channel, which can simplify the model and reduce training time. And normalizing images can help improve the convergence of the training process, as it ensures that the input features are on a similar scale, which can lead to faster training and better performance.

As I approached the assignment on SVM, my mindset was focused on being highly observant and attentive to detail. I aimed to fully engage with the material, keenly noting the intricacies of the algorithm and its application to image classification. At first, I felt relieved and excited that the journal was filled with information that explains some key terms that are prevalent in the journal such as Python tools and kernels. I liked that the journal was organized by steps and each step had an explanation. The information provided helps create a mental web in my mind. I can connect the term Libraries and associate numpy, matplotlib, tensorflow, and scikit-learn to it, also I am able to understand what each of these libraries provide and their

purpose. This introduction had me engaged from beginning to end. When I ran the last part of the code where it displays the results of the evaluation, it was extremely interesting to me. The accuracy of the model was roughly 55% which means it was correct around half of the time. The classification report also ran other means of evaluating which I was unfamiliar with (f1 score, recall, and precision). I wanted to know what they meant so I spent some time looking them up and understanding what it meant. To put it simply, precision reflects the ratio of true positive predictions to the total positive predictions. The F1 score provides a balance between precision and recall, and recall measures the model's ability to find all the relevant cases within the dataset.

```
Accuracy: 0.547
Classification Report:
              precision    recall  f1-score   support

         cat       0.48      0.48      0.48      1000
         dog       0.49      0.48      0.49      1000
        ship       0.66      0.68      0.67      1000

    accuracy                           0.55      3000
   macro avg       0.54      0.55      0.55      3000
weighted avg       0.54      0.55      0.55      3000
```

Overall, this experience deepened my understanding of machine learning and computer vision! I gained valuable skills in data preprocessing, model evaluation, and the application of a machine learning algorithm. I cannot wait to see how I can apply what I learned in this assignment to other assignments down the road. I firmly believe the more I am exposed to exercises like these, the more I will comprehend!

References

Machine learning for computer vision. (n.d.). HCCS Eagle Online. Retrieved September 24, 2024, from https://eagleonline.hccs.edu/courses/266737/files/64009293?module_item_id=17334294

Scarlett's Log. (2020, December 28). *Precision, recall, & F1 score intuitively explained* [Video]. YouTube. https://youtu.be/8d3JbbSj-I8?si=oP0DSM8TvW5yjVnk

Link to Guthub with this assignments journal:

https://github.com/arebolloso/L05_Machine_Learning_Computer_Vision