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Midterm Report

Object detection is an exciting field that has a wide range of real-world applications, from autonomous vehicles to traffic management systems. In my recent project, We set out to create an object detection model that could identify traffic signs using the German Traffic Sign Detection Benchmark (GTSDB) dataset. The experience was both challenging and rewarding, providing valuable insights into how these systems work and where they can improve.

The GTSDB dataset was a great choice for this project because it mirrors real-world challenges. It includes images of various traffic signs, each marked with bounding boxes showing their locations. However, before diving into the training phase, We had to clean and prepare the data. This involved checking and fixing any mistakes in the annotations and removing corrupted images. To make the dataset more diverse, We used data augmentation techniques like flipping, changing brightness, and rotating the images. These steps helped ensure the model would perform well even on images it hadn't seen before. Resizing all images to 224×224224 \times 224 pixels and normalizing their pixel values made the data uniform and ready for training.

To keep things simple, We decided to use the entire dataset for training, skipping the validation split. Eventually, we split the data and trained the model using the Adam

optimizer, 10 epochs. The process wasn't without hiccups, especially with the computational limits of my setup, but we made it work.

One of the biggest lessons from this project was how important it is to handle dataset imbalances. Some traffic signs appeared far more often than others, which made it harder for the model to learn about the rarer ones. We tackled this by carefully augmenting the data, but it's a challenge that needs ongoing attention. Another hurdle was dealing with limited resources. We used Google Colab with GPU support, but its availability wasn't always reliable, forcing me to pause and adapt my workflow.

Looking back, this project has given me a deeper appreciation of the complexities of object detection. Moving forward, I'd like to experiment with other architectures, like EfficientDet, and explore tools like AWS SageMaker for more efficient training. This journey has not only improved my technical skills but also highlighted the real-world impact of machine learning in making systems smarter and more reliable.

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Works Cited

Joshi, Snehal. “10 Best Object Detection Models of 2024: Reviewed & Compared.” *Www.hitechbpo.com*, 24 Oct. 2023, www.hitechbpo.com/blog/top-object-detection-models.php.

Team, Keras. “Keras Documentation: MobileNet and MobileNetV2.” *Keras.io*, keras.io/api/applications/mobilenet/.