NULLCLASS INTERNSHIP REPORT

TASK 3

Submitted by,

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PROBLEM STATEMENT

Create a model to predict the animals in the given picture .it should predict group of animals as well. This model should able to identify child animal as well as adult animals. This model should be able to identify the herbivores and carnivores. if the group of animals are there it should be predict how many herbivores and carnivores are there.

INTRODUCTION

This report outlines the last task of my data science internship, which involves to develop a model that can accurately identify animals in a given image, recognize groups of animals, differentiate between child and adult animals, and classify them as herbivores or carnivores. This capability can be particularly useful for applications in wildlife monitoring, conservation efforts, and enhancing image recognition systems.

BACKGROUND

With advancements in computer vision and deep learning, it has become possible to develop sophisticated models that can perform complex image analysis tasks. The COCO dataset, which contains a wide range of labelled images, serves as an excellent resource for training such models. The task at hand leverages the YOLO (You Only Look Once) model for object detection due to its high accuracy and real-time processing capabilities.

LEARNING OBJECTIVES

- To understand the use of the YOLO model for object detection.
- To learn how to preprocess images for input into the model.
- To develop skills in distinguishing between different classes of animals.
- To implement a method for classifying animals as herbivores or carnivores.
- To accurately count the number of animals and classify them as child or adult.

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ACTIVITIES AND TASKS

Model Setup: Load the YOLO model and COCO class labels.

- Detection Implementation: Develop a function to detect animals in an image using the YOLO model.
- Classification: Classify detected animals as herbivores or carnivores.
- Counting and Grouping: Implement logic to count the number of each type of animal and handle groups of animals.
- Visualization: Draw bounding boxes around detected animals and annotate them with their labels and classifications.

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SKILLS AND COMPETENCIES

Computer Vision: Understanding and applying the principles of object detection.

- Deep Learning: Utilizing pre-trained models like YOLO for practical applications.
- Image Processing: Preprocessing images and visualizing results using libraries such as OpenCV.
- Programming: Writing efficient and effective code in Python to implement the detection and classification logic.

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FEEDBACK AND EVIDENCE

Accuracy: The model's performance was measured in terms of its accuracy in detecting and correctly classifying animals.

- Visualization: The bounding boxes and labels provided visual evidence of the model's capability to correctly identify and classify animals.
- Logs: Print statements and logs were used to verify the number of detected animals and their classifications.

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CHALLENGES AND SOLUTIONS

Overlapping Detections: Non-max suppression was implemented to handle overlapping bounding boxes and reduce redundancy.

- Class Imbalance: Ensuring the model accurately detects both herbivores and carnivores, which may be present in varying numbers, required fine-tuning detection thresholds.
- Classification Accuracy: Differentiating between similar-looking animals was challenging, but was addressed by using a comprehensive list of herbivores and carnivores for reference.

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OUTCOMES AND IMPACT

Successful Detection: The model successfully detected and classified animals in various images, demonstrating its robustness.

- Improved Classification: By correctly identifying herbivores and carnivores, the model provided valuable insights into the animal composition of the images.
- Scalability: The approach can be scaled to include more classes of animals and further refined to improve accuracy.

CONCLUSION

The development of an animal prediction model that can detect, classify, and count animals in images is a significant achievement. It showcases the power of combining deep learning models with comprehensive datasets like COCO. This task not only enhanced understanding and application of computer vision techniques but also provided practical insights into handling real-world image analysis problems. The successful implementation and the ability to handle various challenges underscore the model's potential for broader applications in wildlife monitoring and beyond.