

Machine Learning Engineering Assignment

This assignment involves training a multi-head YOLOv9 model for clothes detection and instance segmentation on the deepfashion dataset and analyzing their performance using the steps below:

1. Download the deepfashion dataset from - https://s3.us-west-2.amazonaws.com/testing_resources/datasets/deepfashion/deep_fashion.tar . Create a small sample of the dataset containing 500 images and divide them into 7:2:1 splits for train, val and test. Only include classes with more than 50 images over the three splits. Convert the sample dataset into YOLO format for training using a modular approach that can be applied to other datasets.
3. Modify the model and training code from <https://github.com/WongKinYiu/yolov9/tree/main> for following features:
 - a. **Add another head to YOLOv9-c model architecture so that you can predict both detection (bounding box) and instance segmentation mask at same time, along with category and confidence scores.**
 - b. **Modify the training script to take a single argument** which contains a yaml config file that has all the arguments and hyperparameters.
 - c. Train the modified YOLOv9-c model architecture by loading weights from pretrained MS COCO weights, on the above prepared dataset using a GPU/CPU model that you have access to.
 - d. Visualize the detection bounding boxes and instance segmentation masks using Jupyter notebook using your trained model.
 - e. Compare the performance metrics for both detection and instance segmentation on validation and test set using **MSCOCO evaluation metrics** using your own code. Explain the performance metric and how you can improve it.
9. Document your code using PyLint (<https://pypi.org/project/pylint/>). Create a document explaining your solution and approach and include it in your GitHub.

Please upload your code, notebook and documentation to a public repository on GitHub and share the link. Use your best intuition in case of doubt. You will need to explain your solution if you are selected for an interview.

NOTES:

1. Please implement your code in a simple, modular way.
2. Perform thorough testing and document well using Google documentation style.
3. Make sure your code achieves a 10/10 score using PyLint.
4. Your code must run with any custom value of hyperparameters in the config file as an input.

All the best,
Matrice Hiring Team