


INTRODUCTION TO COMPUTER VISION: VISUAL PERCEPTION AND GENERATION		
Student's Name	 AIMS African Institute for Mathematical Sciences SENEGAL	Deadline
Uriel Nguefack Yefou		16.05.23, 23:59 pm
May 16, 2023		Ac. Year: 2022 - 2023
Lecturer(s): "Natalia Neverova"		

LAB2: Report

In this project, we will train a D2 Model on a Custom Dataset. We will use a dataset of nuts which has 3 classes: date, fig, and hazelnut, and which is annotated with instance masks. The report has 3 parts.

1 Part A: Visualizations of the training annotations

Before training the model, we prepare and register the data. After that, we visualize the annotations of randomly 2 selected samples in the training set. The result is given by Figure 1 and Figure 2.



Figure 1: Annotation 1 of the nuts dataset



Figure 2: Annotation 1 of the nuts dataset

These figures show us that the annotation has been done well.

2 Part B: Model Initialization and Training Schedule

In this part, we will add training curves as visualized by tensorboard for COCOinit and INinit side by side.

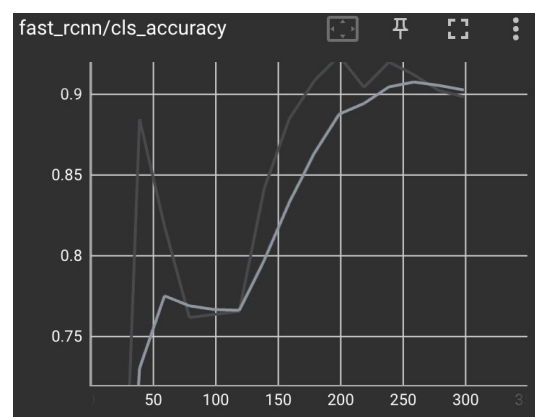
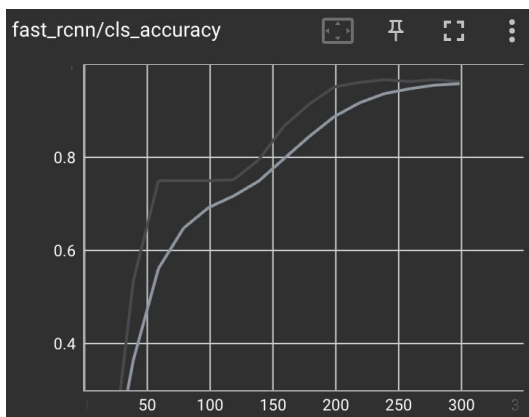


Figure 3: Accuracy with Coco Initialization

Figure 4: Accuracy with ImageNet Initialization

Comments: Figures 3 and 4 present the accuracies for the two models after 300 epochs, we can see that the model with coco initialization has a high accuracy (around 0.98) compared to the model using ImageNet Initialization.

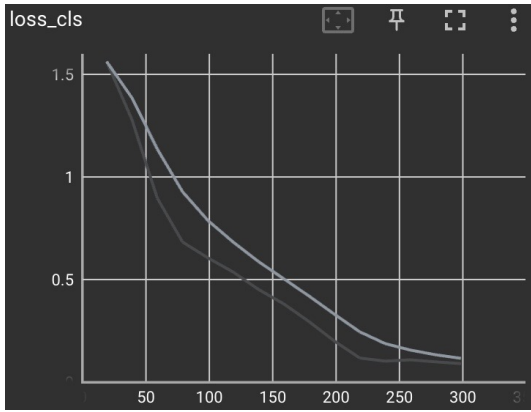


Figure 5: Loss with Coco Initialization

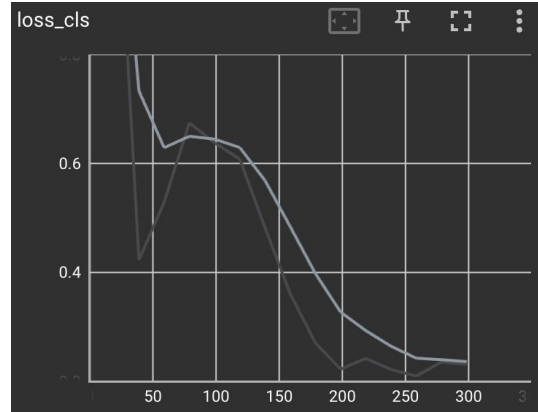


Figure 6: Loss with ImageNet Initialization

Comments: Figures 7 and 8 present the losses for the two models after 300 epochs, we can see that the model with coco initialization is decreasing over the time, the model with ImageNet Initialization decreases at the beginning, but between 55 and 100 epochs, the loss increases and after 100 epochs it starts to decrease again.

3 Part C: Inference and Evaluation of the Trained Model

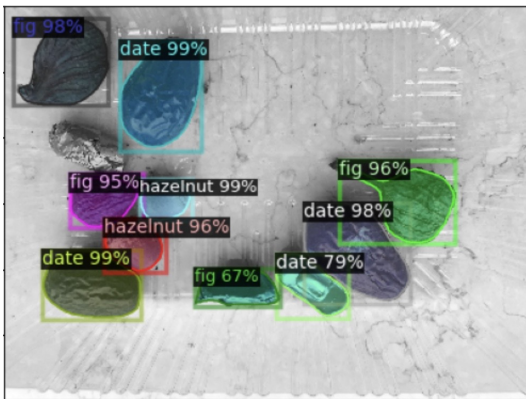


Figure 7: Inference with Coco Initialization

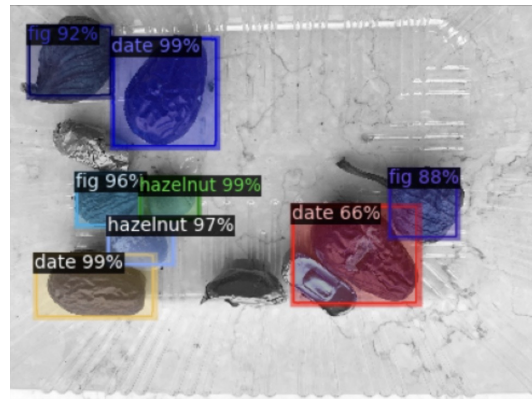


Figure 8: Inference with ImageNet Initialization

Comments: We can see from the figures that the model with Coco Initialization has been able to capture almost all the objects with good precision except one, whereas the model with ImageNet Initialization has missed more objects and the precision on objects detected is small compared with the precision of the model with Coco Initialization.

- Evaluation: Let's add the evaluation results as returned by the COCO api for both models on the validation set.

Weights Initialization	AP	AP 50	AP 75	AP date	AP fig	AP hazelnut
Coco Initialization	82.34	100	95.05	87.38	82.74	77
Imagenet Initialization	47.10	95.05	40.31	63.94	33.81	43.55

Table 1: Evaluation of the 2 models on the validation set

Table 1 presents the Average Precision(AP) for our two models, from this table we can see that the **model with Coco Initialization performs well** than the model with Imagenet Initialization.

Brief Explanation: The custom dataset containing images of date, fig, and hazelnut, are not necessarily well-represented in ImageNet, which is primarily a dataset for image classification. On the other hand, COCO includes images with various object categories, including fruits and vegetables, which are similar to the objects in our dataset. Therefore, pre-training a model on COCO is more likely to result in better performance on our dataset than pre-training on ImageNet.