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Course: Computer Vision 2

Lab Number: 2

Date: May 15, 2020

TRAINING A D2 MODEL ON A CUSTOM DATASET

1. **Introduction**

   In this practitical session, we prepared a custom dataset and training on Detecrton2 models. We used nuts datasets which has 3 classes: date, flig and hazeinut. We also used Coco dataset to register instances that results in two different datasets metadata catalog contain whole data and dataset catalog contains bounding box datasets. To visualise curves of the accuracy, precision and loss function, we used tensorboard. In training part we set boolean to true for using Coco pre-trained weight else we use ImageNet weights. The criteria followed in training are: train for 300 iterations, learning rate of 0.02, 2 images per batch and 128 regions per batch.

2. **Visualizations of the training annotations**

   In this part we visualised the output of two models after training and we made predictions to assess their performance. The percentage on estimation shows how model identified objects and which one had better performance on nuts datasets. The average accuracy of date and fig in Coco model are high compaired to ImageNet model. The average accuracy of hazelnut in ImageNet performes better than Coco model as classifying hazelnut. From the above visualization we can conlude that Coco model performs better than ImageNet model.
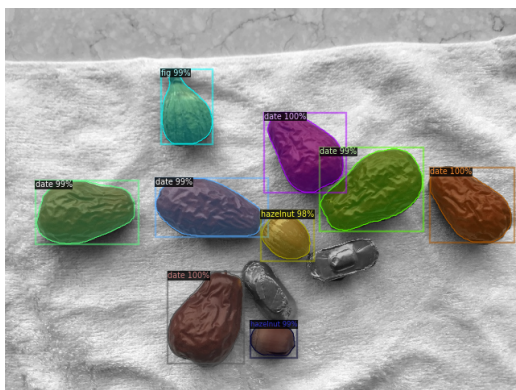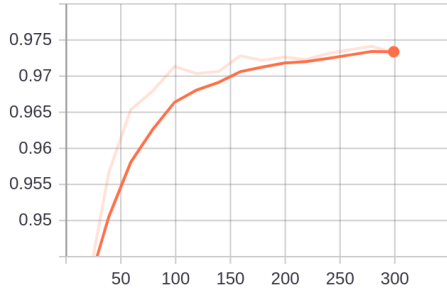

(a) Output image on Coco model.
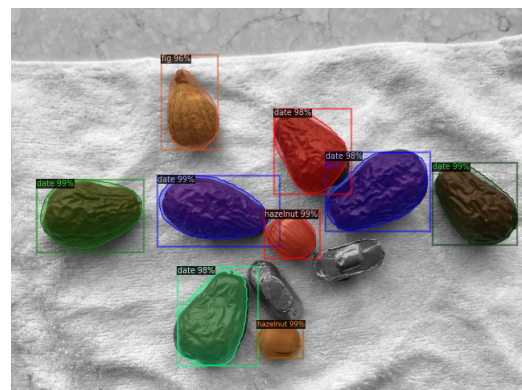
(b) Output image on ImageNet model.

3. **Training curves as visualized by tensorboard**

   In this part we will visualize the training curves by tensorboard for both Coco dataset and ImageNet datasets. We will also use predictions on the validation set and do comparions between the two models. Afterward we will conclude the best model between the two. The final accuracy value on Coco model is 97.33% compaired to ImageNet model accuracy as 95.01% in the figure 2b, accuracy started increasing between 100 to 300 whereas on the accuracy figure 2a of Coco increases before 50 to 300 with better trend. The total loss on two models are also differ, Coco model converges faster with final value of 0.297 as shown in figure 2c, on the other hand ImageNet total loss function with final value of 0.66 as shown in figure 2d. This shows that Coco model performs better compaired to ImageNet model.
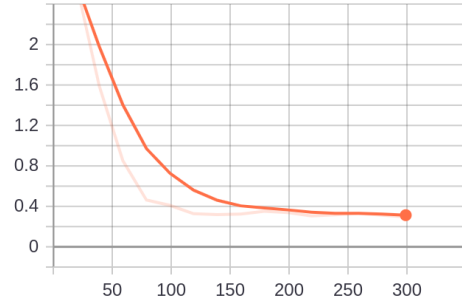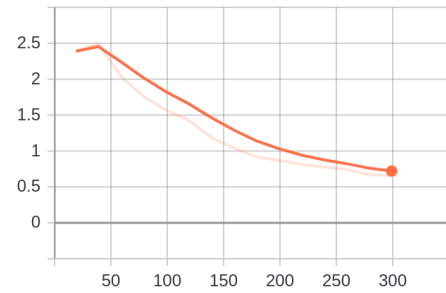
(a) Accuracy curve of Coco model.
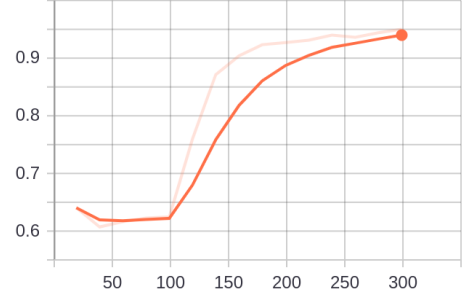
(b) Accuracy curve of ImageNet model.

(c) Total loss curve of Coco model.

(d) Total loss curve of ImageNet model.

Figure 2: Different Training curves in tensorboard of COCO and ImageNet models.

4. **Evaluation of two models**

In this part we evaluate and compare two different models using the average precision on bounding box and segmentation method as shown in table below. Based on the average precision measures, Coco dataset performs better during prediction. This may be caused by large dataset trained on Coco dataset compaired to Imageanet dataset.

(a) Coco dataset

Table 1: Evaluation of coco model on nuts dataset.

Category	date	fig	hazelnut	Mean AP
Bounding Box	89.78	75.64	74.85	80.09
Segmentation	97.66	89.26	86.46	91.13

(b) ImageNet dataset

Table 2: Evaluation of ImageNet model on nuts dataset.

Category	date	fig	hazelnut	Mean AP
Bounding Box	80.89	48.70	68.68	66.09
Segmentation	82.94	58.29	82.95	74.73

References

[1] https://github.com/facebookresearch/detectron2

[2] https://github.com/gkioxari/aims2020-visualrecognition/releases/download/v1.0/nuts.zip