Report: Lab2-Dectectron2

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A. *Introduction:*

This report is a continuation of Lab1 of my exploration of Detectron2, but this time around the focus is on a custom dataset which aims to train two schemes to detect nuts in an image. All the necessary dependencies are similar to that of the previous exercise.

B. *Model Initialization and Training Schedule*

In this section, I initialized the model with two schemes, namely: 1) Pretrained Model on COCO dataset - "COCOinit" 2) Model with ImageNet Weights - "INit". During the implementation, I used a boolean-flag named "$with_coco_init$", which when set to "TRUE" allowed the model to use COCO weights otherwise, ImageNet weights are used. Other parameters were set as follows;

- Iterations: 300
- LR: 0.02
- Batch: 2
- Regions per Batch: 128
- Number of Classes: 3

C. *Visualizing Tensorboard Training Curves*

COCO Weights: After training, it relatively took 2m 52s for the $total_loss$ curve to finally converge with a smoothed loss of 0.312 upon 299 steps. On the other hand, I had a $fast_rcnn$ accuracy of 98%, which became stable after 200 iterations. The False-Negative recorded 0.04 value.

ImageNet Weights: After training, it relatively took 1m 22s for the $total_loss$ curve to finally converge with a smoothed loss of 0.766 upon 299 steps. On the other hand, I had a $fast_rcnn$ accuracy of 93%. The False-Negative is 0.15 value.

Fig. 1. COCCO: Accuracy / False Positive

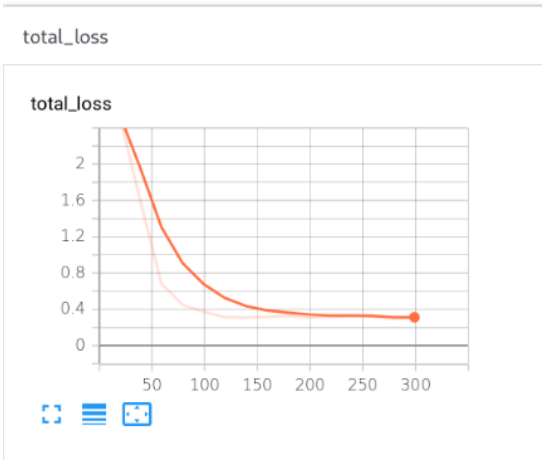

Fig. 2. COCCO: Total Loss

Fig. 3. ImageNet: Accuracy / False Positive

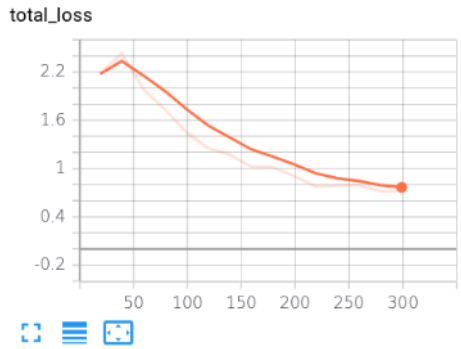

Fig. 4. ImageNet: Total Loss

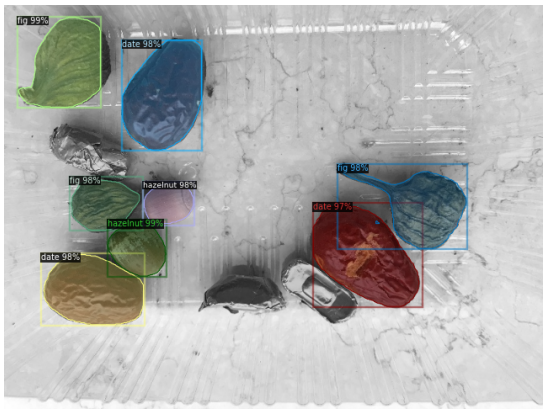

Fig. 5. COCO: Segmentation / Prediction

D. Inference and Evaluation

COCO Prediction:
Date = 98%, 98%, 97%
Fig = 99% 98%, 98%
Hazelnut = 99%, 98%

ImageNet Prediction:
Date = 99%, 98%, 96%
Fig = 97% 91%, 89%
Hazelnut = 100%, 99%

AP Metric: COCO-
Date = 97.820
Fig = 86.327
Hazelnut = 91.683

AP Metric: ImageNet-
Date = 81.986
Fig = 68.155
Hazelnut = 81.101

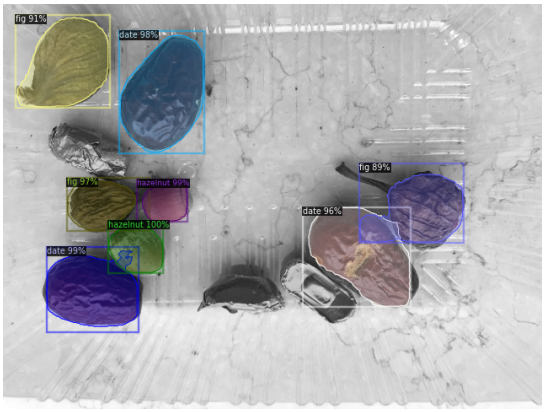

Fig. 6. ImageNet: Segmentation / Prediction

E. Conclusion

From the above data I conclude that the COCO Pretrained model has a higher training accuracy than ImageNet's. However, upon prediction, I noticed that both models achieved relatively similar estimations, thus, mostly over 90% detection rates except for the 89% that Imagenet predicted for fig nut. The Average Precision for COCO was also better than that of ImageNet. Tensorboard also allowed me to visualize the training curves, including accuracy rates.

References

[1] http://cocodataset.org/home
[2] https://colab.research.google.com/drive/16jcaJoc6bCFAQ96jD
[3] https://github.com/facebookresearch/detectron2/blob/master/
[4] https://github.com/gkioxari/aims2020_visualrecognition/releases/downlo