Deep Learning Report

Lab Assignment 5: Docker

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B20AI052

Question 01

Aim: Implement a Neural Network using the IRIS dataset. Perform backpropagation using early stopping. We can choose the activation function and loss function at your convenience, which gives the best performance.

The Neural Network should have 2 hidden layers, one with 4 neurons and one with 5 neurons. The input layer should have 4 neurons and the output layer should have 3 neurons.

Procedure:

- Firstly, I converted my .ipynb file to .py format.
- Then, I created a directory named dlops_lab_5_docker in which my file named B20AI052_Lab_Assignment_5.py is saved.
- After which I set up docker on my Ubuntu environment.
- Then, I used the command “docker pull nvcr.io/nvidia/pytorch:23.02-py3” to pull the Pytorch image from the NVIDIA GC web.
- Output of “docker images”:

```
ayushabrol@pop-os:~$ docker images
REPOSITORY                TAG         IMAGE ID       CREATED         SIZE
nvcr.io/nvidia/pytorch    23.02-py3   7c3375e220ea   4 weeks ago     20.5GB
pytorch/pytorch           latest      71eb2d092138   2 months ago    9.96GB
<none>                    <none>      dd1aebbfd792   9 months ago    11.1MB
ayushabrol/redis          latest      2b9840e694a9   9 months ago    11.1MB
redis                     latest      604d80444252   9 months ago    117MB
busybox                   latest      62aedd01bd85   9 months ago    1.24MB
ubuntu                    latest      27941809078c   9 months ago    77.8MB
alpine                    latest      e66264b98777   10 months ago   5.53MB
hello-world               latest      feb5d9fea6a5   18 months ago   13.3kB
centos                    latest      5d0da3dc9764   18 months ago   231MB
```

- The first image in the list is our newly downloaded image.
- Then I ran the command “docker run -it –name dlops_lab_assignment_5 nvcr.io/nvidia/pytorch:23.02-py3” to create a container instance of the Pytorch image with the name dlops_lab_assignment_5 and used -it for running it in interactive mode.
- Output of “docker ps -a”:

```
ayushabrol@pop-os:~$ docker ps -a
CONTAINER ID   IMAGE                                COMMAND                  CREATED          STATUS                      PORTS     NAMES
ead60a382883   nvcr.io/nvidia/pytorch:23.02-py3     "/opt/nvidia/nvidia_…"   16 minutes ago   Exited (0) 13 minutes ago             dlops_lab_assignment_5
bc3b290fcc4b   busybox                              "sh"                     8 hours ago      Exited (0) 8 hours ago                beautiful_sinoussi
9071d4cf3a58   7c3375e220ea                         "/opt/nvidia/nvidia_…"   10 hours ago     Exited (0) 10 hours ago               elastic_wiles
f119d2d56bef   ubuntu                               "bash"                   9 months ago     Exited (0) 9 months ago               competent_robinson
2aaa567f28bd   dd1aebbfd792                         "/bin/sh -c \"redis-s…"  9 months ago     Exited (0) 9 months ago               peaceful_wiles
72136459db94   dd1aebbfd79                          "/bin/sh -c \"redis-s…"  9 months ago     Exited (0) 9 months ago               hopeful_ride
c498c4c3aff7   alpine                               "sh"                     9 months ago     Exited (137) 9 months ago             condescending_mahavira
cbfac540314f   ayushabrol/redis                     "redis-server"           9 months ago     Exited (0) 9 months ago               nifty_khorana
9dfa9b3e4b2e   2b9840e694a9                         "redis-server"           9 months ago     Exited (0) 9 months ago               awesome_grothendieck
4c65c180b8b8   ubuntu                               "bash"                   9 months ago     Exited (130) 9 months ago             dazzling_pike
470590ed1d40   ubuntu                               "bash"                   9 months ago     Exited (0) 9 months ago               gifted_lichterman
1840d816f6ce   redis                                "docker-entrypoint.s…"   9 months ago     Exited (0) 9 months ago               frosty_lehmann
```

- The first instance is our newly created container named dlops_lab_assignment_5.
- Then, I entered the shell of the container created.

```
ayushabrol@pop-os:~$ docker attach dlops_lab_assignment_5
root@ead60a382883:/workspace#
```

- We can explore the already installed libraries and already added files of the image in the container.
- Then, I came out of the container using Ctrl+P followed by Ctrl+Q, without actually stopping the container and it was still running in the background. We can check this using docker ps.

```
ayushabrol@pop-os:~$ docker ps
CONTAINER ID   IMAGE                                COMMAND                  CREATED          STATUS          PORTS                NAMES
ead60a382883   nvcr.io/nvidia/pytorch:23.02-py3     "/opt/nvidia/nvidia_…"   21 minutes ago   Up 2 minutes    6006/tcp, 8888/tcp   dlops_lab_assignment_5
```

- Now, I copied the contents from my local storage to my container using the command “docker cp [SOURCE PATH] dlops_lab_assignment_5:/[DEST PATH]”.
- Now, when we again enter the container shell using “docker attach dlops_lab_assignment” and checked the contents of the workspace directory using “ls” command.

```
ayushabrol@pop-os:~$ docker attach dlops_lab_assignment_5
root@ead60a382883:/workspace# ls
NVIDIA_Deep_Learning_Container_License.pdf  README.md  dlops_lab_5_docker  docker-examples  examples  tutorials
```

- We can observe that our directory containing the code has been copied to our container.

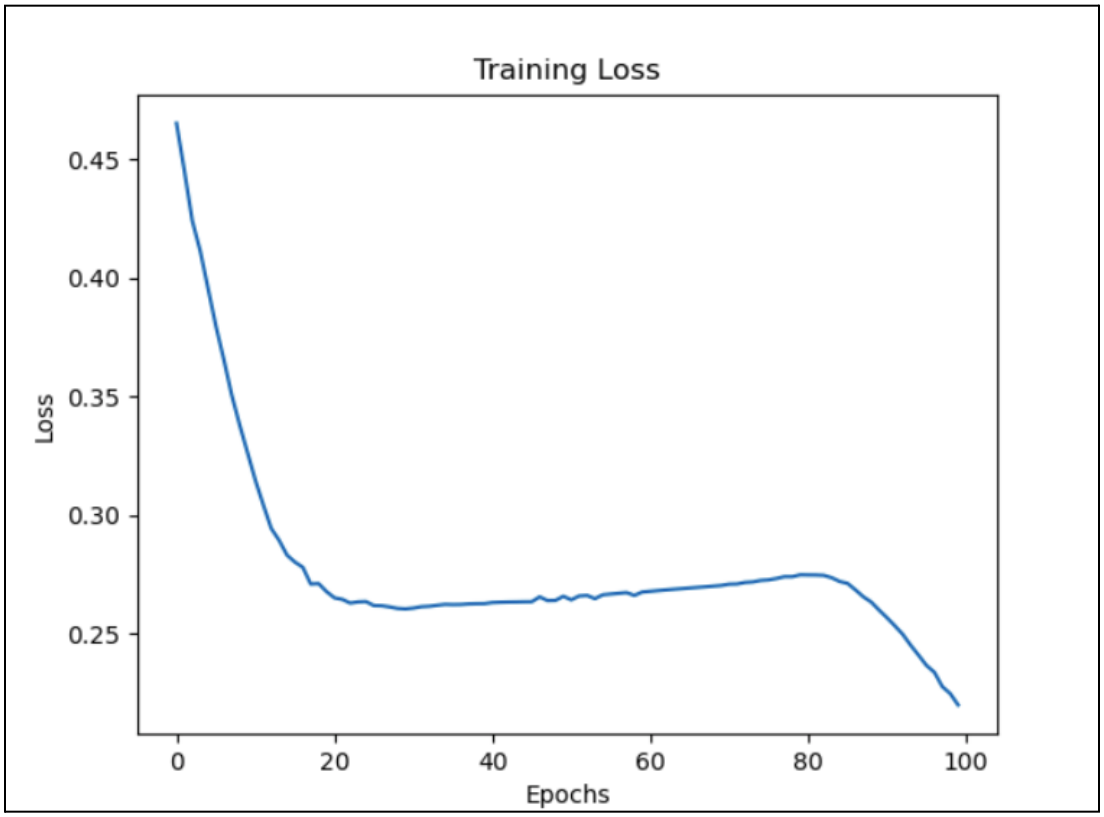
- Now we enter the directory using cd [DIR].

```
root@ead60a382883:/workspace# ls dlops_lab_5_docker/
B20AI052_Lab_Assignment_5.py  model.pkl  training_loss.png
```

- And run the file B20AI052_Lab_Assignment_5.py using “python3 B20AI052_Lab_Assignment_5.py”.
- And got the following outputs when our code ran in the docker container.

```
Epoch: 87 Error:  0.009790727988432857
---------------------------------
Epoch: 88 Error:  0.009718113578098776
---------------------------------
Epoch: 89 Error:  0.009653238704522156
---------------------------------
Epoch: 90 Error:  0.009493740888756772
---------------------------------
Epoch: 91 Error:  0.009458475520133456
---------------------------------
Epoch: 92 Error:  0.009425887013721582
---------------------------------
Epoch: 93 Error:  0.009395932870813696
---------------------------------
Epoch: 94 Error:  0.009268375344355975
---------------------------------
Epoch: 95 Error:  0.009260966945145914
---------------------------------
Epoch: 96 Error:  0.009250012439508655
---------------------------------
Epoch: 97 Error:  0.00914029329493872
---------------------------------
Epoch: 98 Error:  0.009075667021091803
---------------------------------
Epoch: 99 Error:  0.008992583690424933
---------------------------------
Epoch: 100 Error:  0.009012763595686106
---------------------------------
Training Completed...
Model saved successfully...
Accuracy on the testing data:  97.77777777777777 %
root@ead60a382883:/workspace/dlops_lab_5_docker#
```

- And our loss curves were also saved.



END OF LAB ASSIGNMENT 5: DOCKER