Report : Cifar10 performance and Robot model with camera

Summary of my internship

- Performance on a cifar10 model
- Difference of the batch size
- Make a pytorch model for the robot
- Training of both model on llrai01
- Make them work on the jetson
- Add the camera

Comparative table Pytorch

Time	PC	Llrai01	Jetson
Import	2,04s	1,15s	6,37s
Loader setup	1,90s	4,50s	49,5s
Model setup	0,00s	2,18s	108s = 1,48min
Train 1	40,6s	41,03s	372s = 6,12min
Train 2	38,9s	31,70s	171s = 2,51min
Train/image	7,78-1ms	6,34E-1ms	3,42ms
Train 3	39,2s	27,7s	169s = 2,49min
Mean train	39,6s	33,5s	237s = 3,57min
Mean test/epoch	4,59s	2,60s	18,8s
Test/image	4,59E-1ms	2,60E-1ms	1,88ms
Mean loading	2,82E-2s	0,34s	4,13s
Loading/image	4,7E-04ms	5,67E-03ms	6,88E-02ms

Comparative table tensorflow

Time	PC	Llrai01	Jetson
Import	6,71s	3,14s	16,7s
Loader setup	57,69s	1,02s	87,6s
Model setup	0,14s	5,67s	52,1s
Train 1	36s	31s	345s
Train 2	39s	27s	184s
Train/image	7,8E-1ms	5,4E-1ms	3,68ms
Train 3	36s	26s	193s
Mean train	36,95s	28s	241s
Mean test/epoch	2,62s	2	62.07s
Test/image	2,62E-1ms	2E-1ms	6,2ms

Comparative table PC

Time	tensorflow	Pytorch
Import	6,71s	2,04s
Loader setup	57,69s	1,90s
Model setup	0,14s	0,00s
Train 1	36s	40,6s
Train 2	39s	38,9s
Train/image	7,8E-1ms	7,78-1ms
Train 3	36s	39,2s
Mean train	36,95s	39,6s
Mean test/epoch	2,62s	4,59s
Test/image	2,62E-1ms	4,59E-1ms

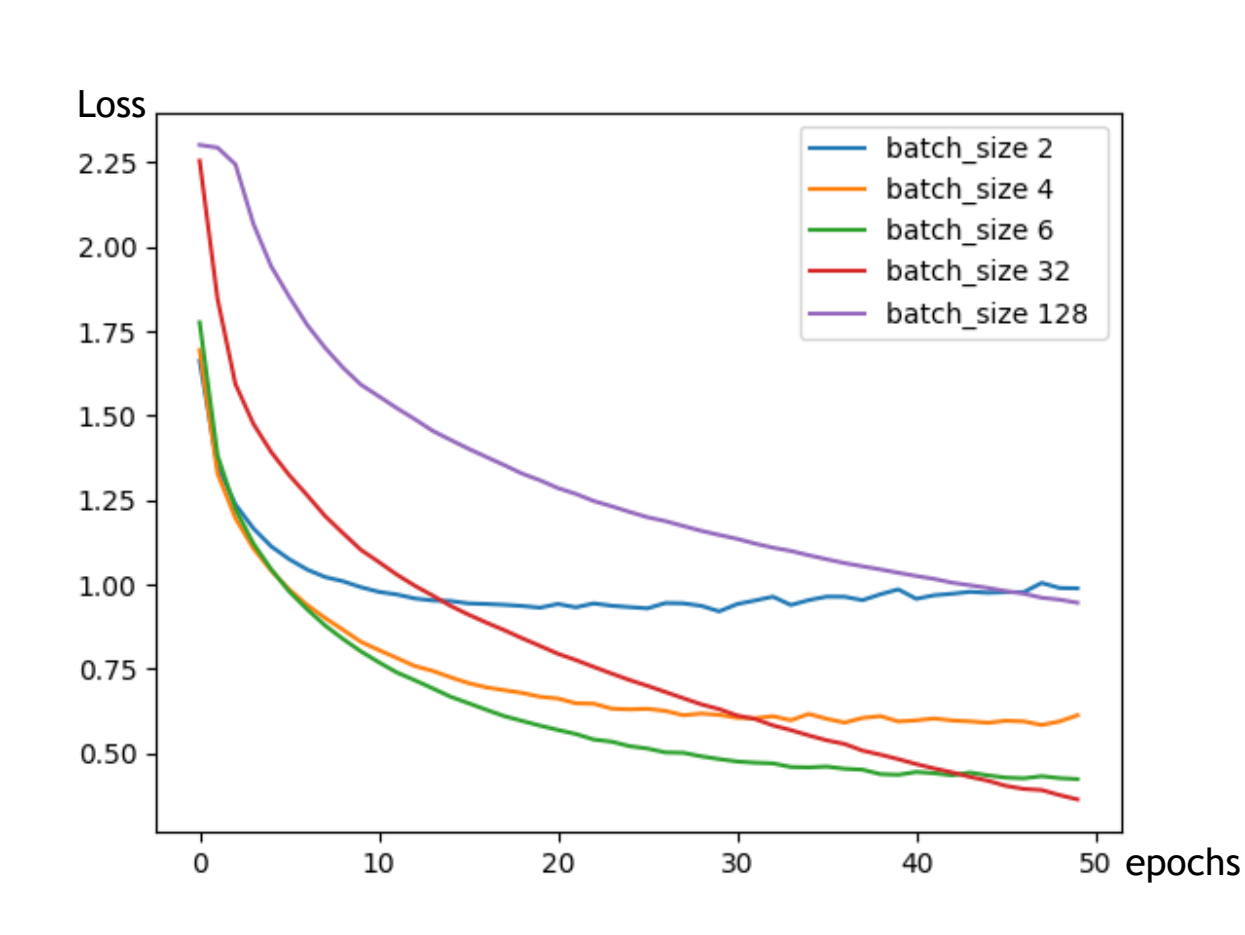
Comparative table Llrai01

Time	tensorflow	Pytorch
Import	3,14s	1,15s
Loader setup	1,02s	4,50s
Model setup	5,67s	2,18s
Train 1	31s	41,03s
Train 2	27s	31,70s
Train/image	5,4E-1ms	6,34E-1ms
Train 3	26s	27,7s
Mean train	28s	33,5s
Mean test/epoch	2s	2,60s
Test/image	2E-1ms	2,60E-1ms

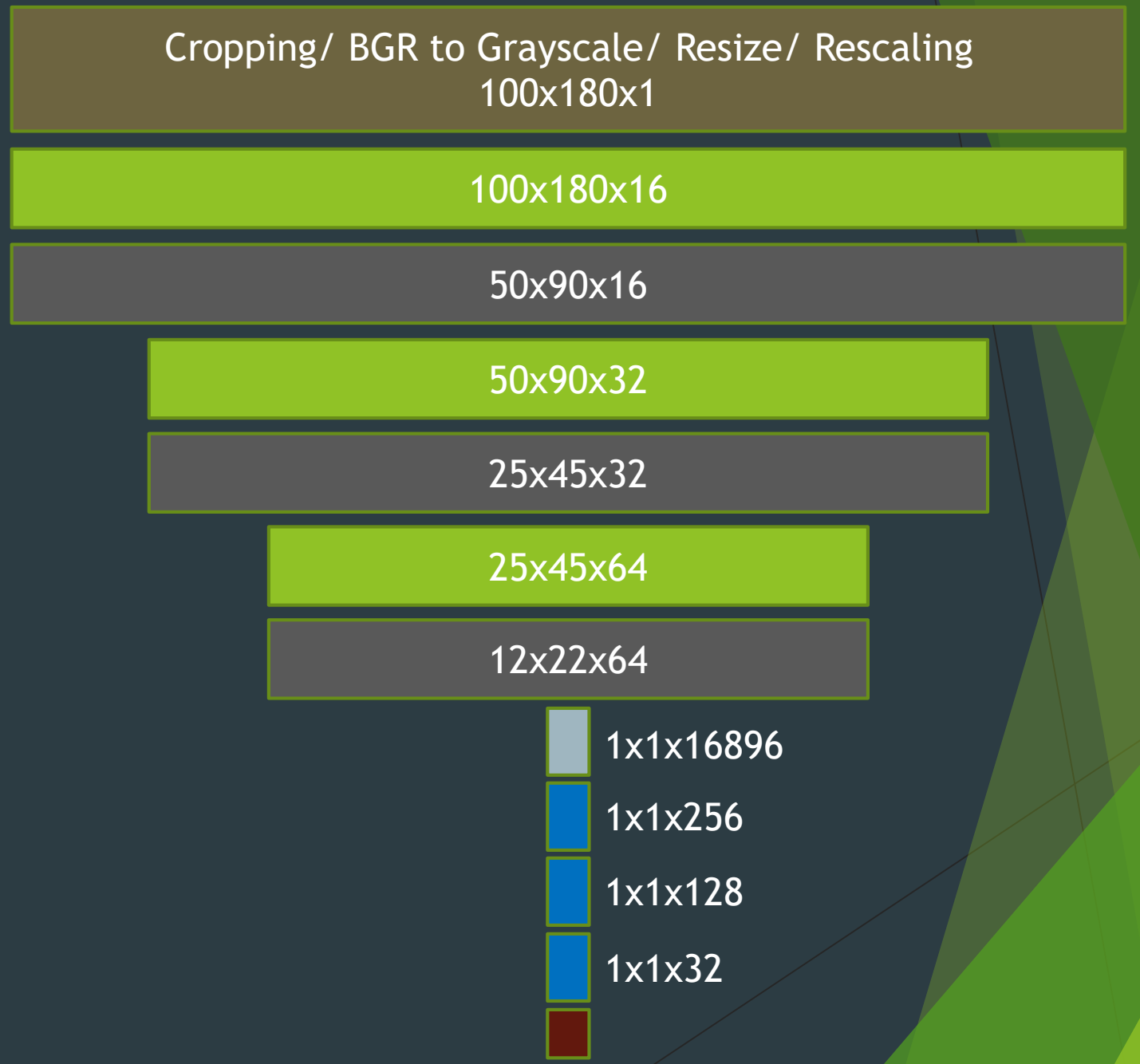
Comparative table Jetson

Time	tensorflow	Pytorch
Import	16,7s	6,37s
Loader setup	87,6s	49,5s
Model setup	52,1s	108s = 1,48min
Train 1	345s	372s = 6,12min
Train 2	184s	171s = 2,51min
Train/image	3,68ms	3,42ms
Train 3	193s	169s = 2,49min
Mean train	241s	237s = 3,57min
Mean test/epoch	18s	18,8s
Test/image	1,8ms	1,88ms

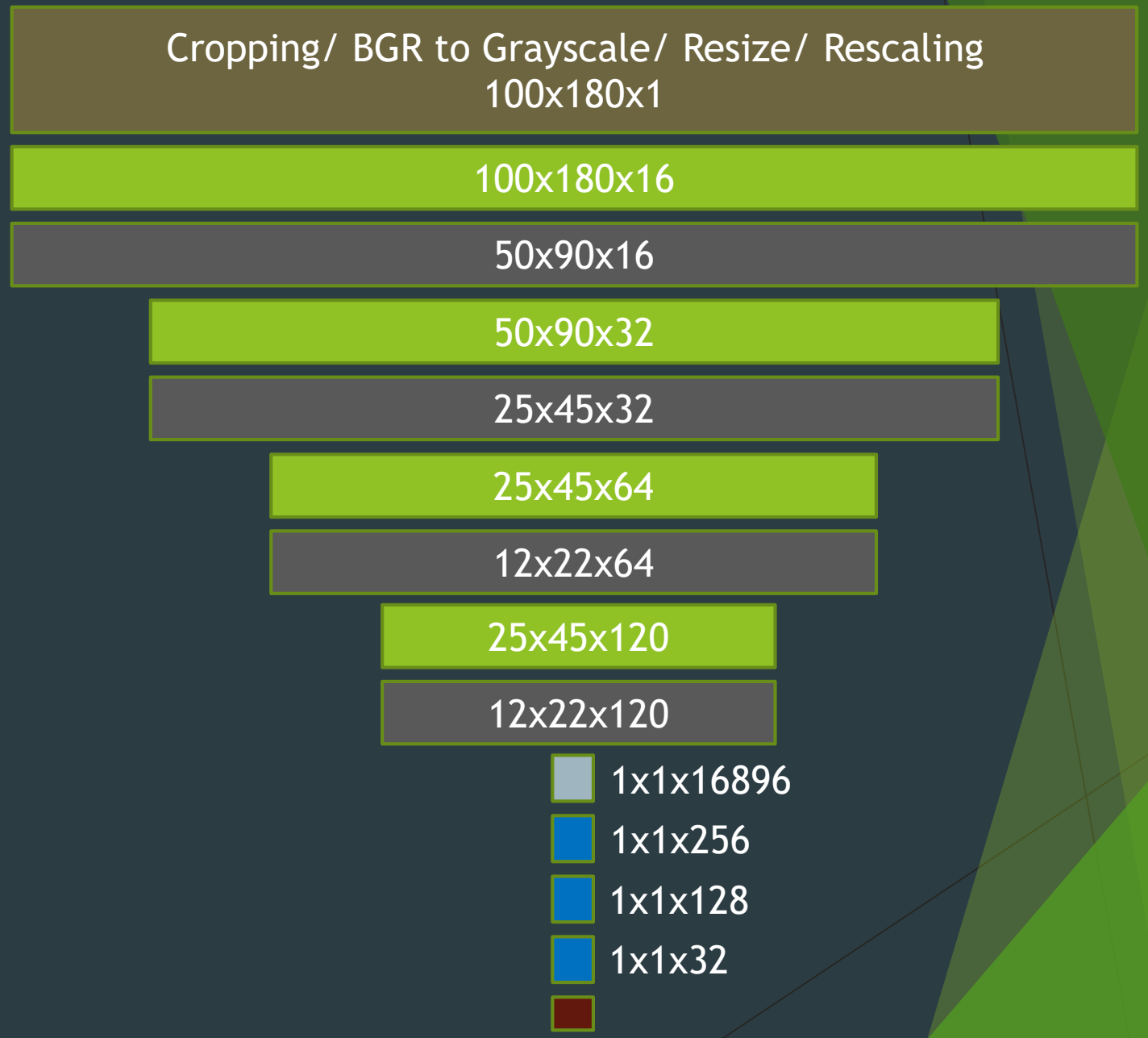
Batch 50 epochs



Robot model


Cropping/ BGR to Grayscale/ Resize/ Rescaling
100x180x1
100x180x16
50x90x16
50x90x32
25x45x32
25x45x64
12x22x64
1x1x16896
1x1x256
1x1x128
1x1x32
Convolution + ReLU
MaxPooling
Flatten
Linear
Softmax

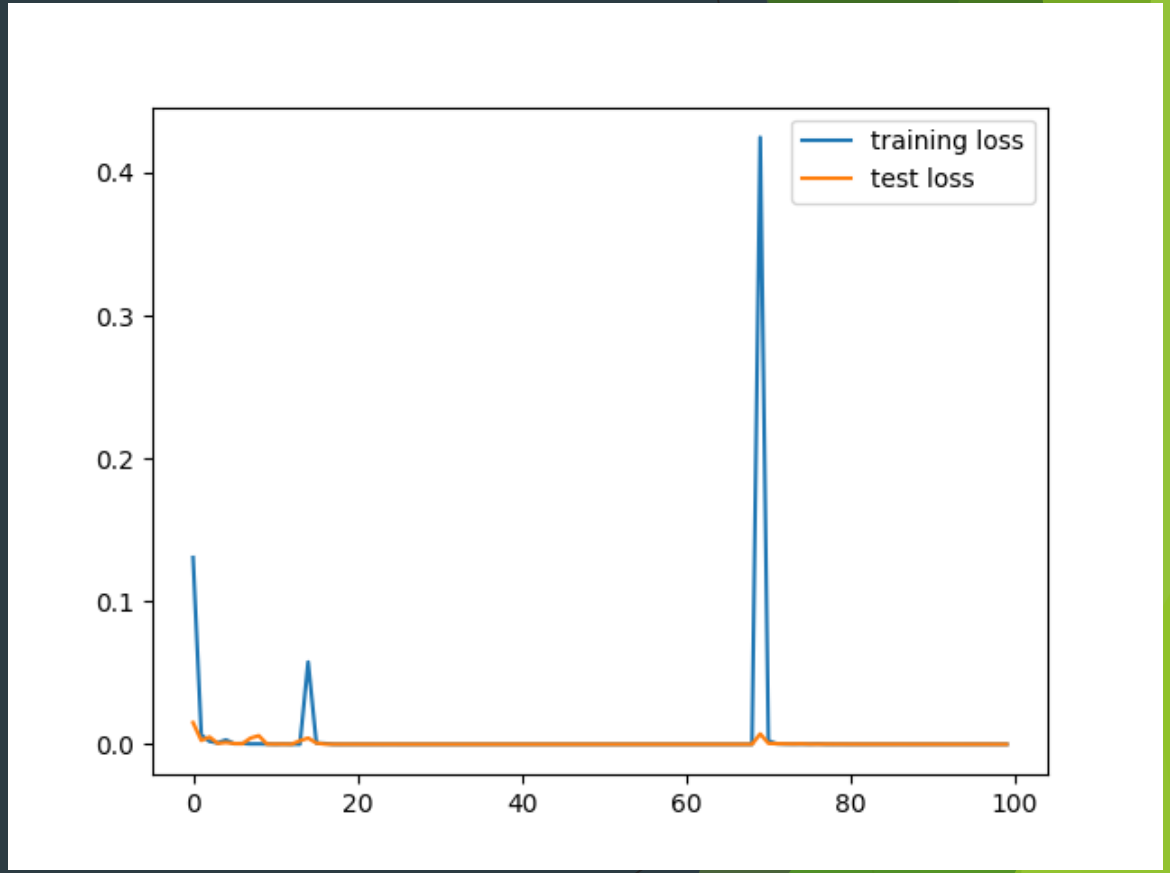
Robot model for the Jetson



Robot training time on llrai01 : pytorch

Time	Pytorch
Import	2.43s
Loader setup	0.24s
Model setup	1.10s
Mean train*	112.33s
Train/image	2.12ms
Mean test/epoch	11.98s
Test/image	2.03ms

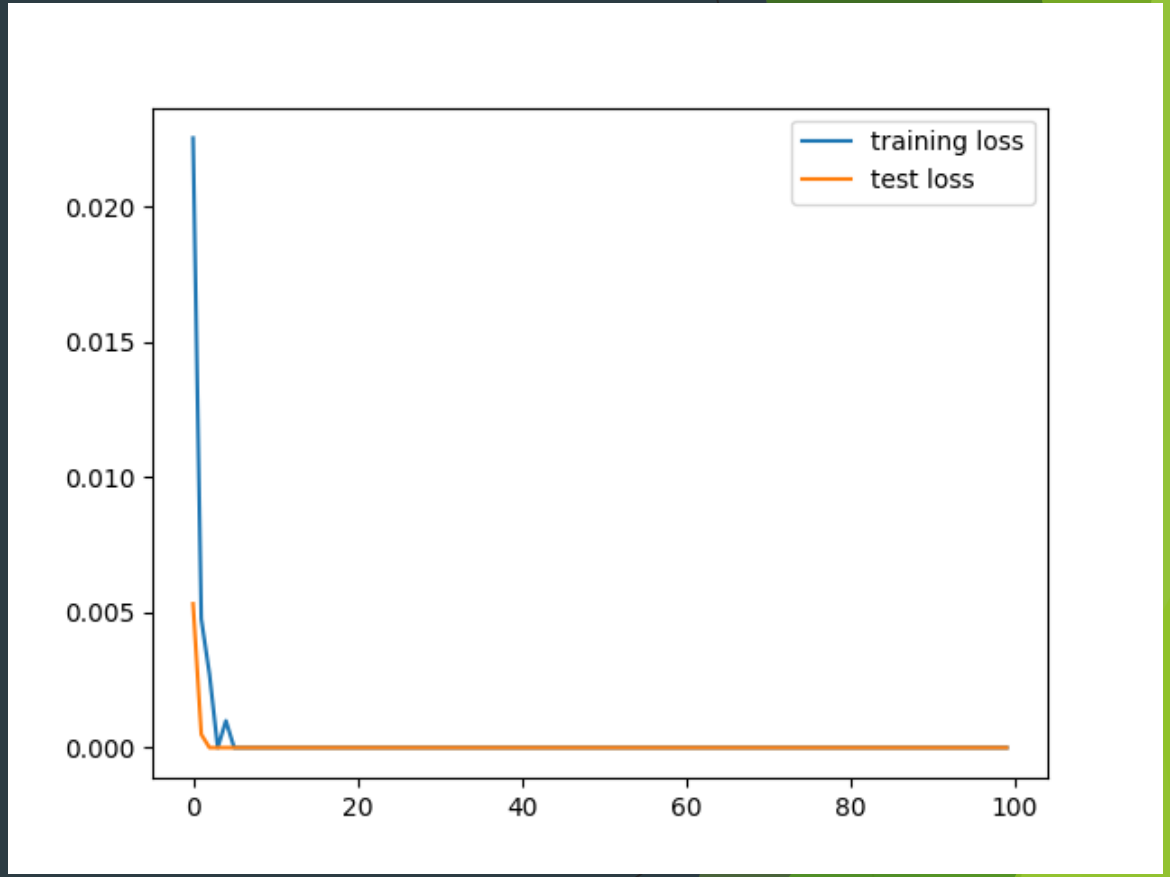
With training set :
Final loss : 2E-4%
Final accuray : 100%



Robot training time on llrai01 : tensorflow

Time	tensorflow
Import	2.93s
Loader setup	9.00s
Model setup	0.15s
Mean train*	7.58s
Train/image	1.28E-1ms
Mean test/epoch	1.17s
Test/image	9.9E-2ms

With training set :
Final loss : 2E-4%
Final accuray : 100%



Robot training time on llrai01

Time	tensorflow	Pytorch
Import	2.93s	2.43s
Loader setup	9.00s	0.24s
Model setup	0.15s	1.10s
Mean train*	7.58s	112.33s
Train/image	1.28E-1ms	2.12ms
Mean test/epoch	1.17s	11.98s
Test/image	9.9E-2ms	2.03ms

Robot with camera time

time	Robot model
Import time	18.65s
Camera setting time	2.39s
Model loading time	15.54s
After 2 min :	
Mean image setup time*	6.31ms
Mean forward time*	2.78E-1s
Mean frame time*	2.875E-1s

Test made with a picture took every 2 sec
*mean made on 10 frames

Link to the github :

- https://github.com/Loe2b/my_ml