```
import torch
print(torch.cuda.is_available())
```

```
True
```

```
!pip install detecto
```

```
import numpy as np
import matplotlib.pyplot as plt
from torchvision import transforms
from detecto import core, utils, visualize
from detecto.visualize import show_labeled_image, plot_prediction_grid
```

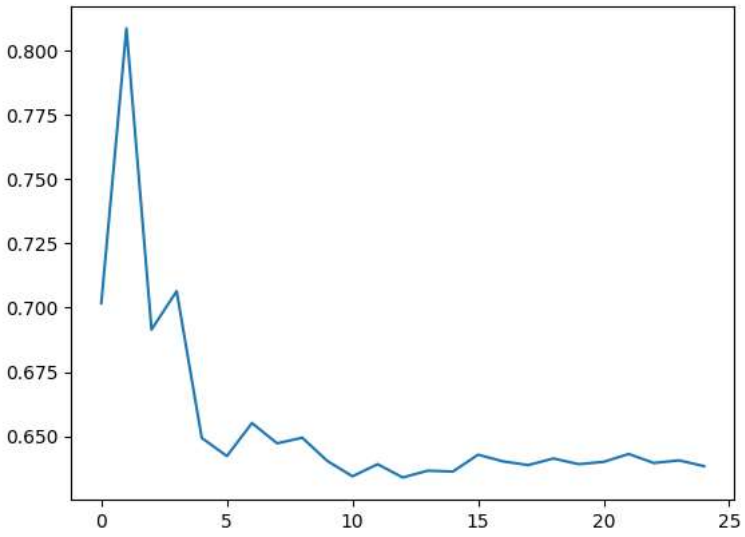
```
custom_transforms = transforms.Compose([
transforms.ToPILImage(),
transforms.Resize(900),
transforms.RandomHorizontalFlip(0.5),
transforms.ColorJitter(saturation=0.2),
transforms.ToTensor(),
utils.normalize_transform(),
])
```

```
Train_dataset=core.Dataset('train/',transform=custom_transforms)#L1
Test_dataset = core.Dataset('test/')#L2
loader=core.DataLoader(Train_dataset, batch_size=2, shuffle=True)#L3
model = core.Model(['Nozzle'])#L4
losses = model.fit(loader, Test_dataset, epochs=25, lr_step_size=5, learning_rate=0.001, verbose=True)#L5
```

```
/usr/local/lib/python3.10/dist-packages/torchvision/models/_utils.py:208: UserWarning: The parameter 'pretrained' is deprecated since
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/torchvision/models/_utils.py:223: UserWarning: Arguments other than a weight enum or `None` fo
  warnings.warn(msg)
Downloading: "https://download.pytorch.org/models/fasterrcnn_resnet50_fpn_coco-258fb6c6.pth" to /root/.cache/torch/hub/checkpoints/fas
100%|██████████| 160M/160M [00:00<00:00, 259MB/s]
Epoch 1 of 25
Begin iterating over training dataset
100%|██████████| 18/18 [00:20<00:00,  1.14s/it]
Begin iterating over validation dataset
100%|██████████| 15/15 [00:06<00:00,  2.38it/s]
Loss: 0.7016994953155518
Epoch 2 of 25
Begin iterating over training dataset
100%|██████████| 18/18 [00:18<00:00,  1.05s/it]
Begin iterating over validation dataset
100%|██████████| 15/15 [00:06<00:00,  2.39it/s]
Loss: 0.8084323763847351
Epoch 3 of 25
Begin iterating over training dataset
100%|██████████| 18/18 [00:15<00:00,  1.15it/s]
Begin iterating over validation dataset
100%|██████████| 15/15 [00:07<00:00,  2.09it/s]
Loss: 0.6914468765258789
Epoch 4 of 25
Begin iterating over training dataset
100%|██████████| 18/18 [00:16<00:00,  1.09it/s]
Begin iterating over validation dataset
100%|██████████| 15/15 [00:07<00:00,  2.07it/s]
Loss: 0.7063763558864593
Epoch 5 of 25
Begin iterating over training dataset
100%|██████████| 18/18 [00:13<00:00,  1.29it/s]
Begin iterating over validation dataset
100%|██████████| 15/15 [00:06<00:00,  2.19it/s]
Loss: 0.649351966381073
Epoch 6 of 25
Begin iterating over training dataset
100%|██████████| 18/18 [00:13<00:00,  1.30it/s]
Begin iterating over validation dataset
100%|██████████| 15/15 [00:06<00:00,  2.37it/s]
Loss: 0.6423109988371531
Epoch 7 of 25
Begin iterating over training dataset
100%|██████████| 18/18 [00:13<00:00,  1.33it/s]
Begin iterating over validation dataset
100%|██████████| 15/15 [00:07<00:00,  2.14it/s]
Loss: 0.6551357805728912
Epoch 8 of 25
```

```
Begin iterating over training dataset
100%|██████████| 18/18 [00:15<00:00,  1.19it/s]
Begin iterating over validation dataset
100%|██████████| 15/15 [00:08<00:00,  1.80it/s]
Loss: 0.6472621699174245
Epoch 9 of 25
Begin iterating over training dataset
100%|██████████| 18/18 [00:14<00:00,  1.22it/s]
```

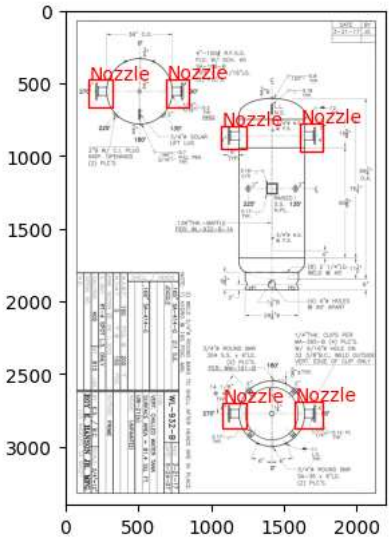
```
plt.plot(losses)
plt.show()
```




```
model.save('model_weights.pth')
model = core.Model.load('model_weights.pth', ['Nozzle'])
```

```
# image = utils.read_image('pressure vessel.jpg')
# predictions = model.predict(image)
# labels, boxes, scores = predictions
# show_labeled_image(image, boxes, labels)
```

```
thresh=0.6
filtered_indices=np.where(scores>thresh)
filtered_scores=scores[filtered_indices]
filtered_boxes=boxes[filtered_indices]
num_list = filtered_indices[0].tolist()
filtered_labels = [labels[i] for i in num_list]
show_labeled_image(image, filtered_boxes, filtered_labels)
```



✓ 0s completed at 3:19 PM