Machine Learning

Laboratory on pytorch

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Set-up on Google Colab

Open the file on `Google Colaboratory`:

Figure 1: QR code to open Colab

Make sure to set the **runtime type to T4 GPU**.

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Take-home Exercise

As a self-assessment exercise, complete a classification task using **pytorch**:

Steps:

1. Choose a dataset.
2. Design an appropriate Neural Network.
3. Train and tune the network (visualize the train and val curves).
4. Perform hyperparameter optimization.
5. Evaluate the model on the test set.

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Suggested Datasets: MNIST

The dataset consists in handwritten digits: *1×28×28 grayscale*. It has *10* classes (digits ranging from 0 to 9)

```
from torchvision import datasets, transforms
from torch.utils.data import DataLoader

transform = transforms.ToTensor()

trainset = datasets.MNIST(root="./data",
    train=True, download=True, transform=transform)
testset  = datasets.MNIST(root="./data",
    train=False, download=True, transform=transform)
```

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Suggested Datasets: Fashion-MNIST

The datasets consists in clothing items, same format as MNIST. It has *10* classes.

```
from torchvision import datasets, transforms
from torch.utils.data import DataLoader

transform = transforms.ToTensor()

trainset = datasets.FashionMNIST(root="./data",
    train=True, download=True, transform=transform)
testset  = datasets.FashionMNIST(root="./data",
    train=False, download=True, transform=transform)
```

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Suggested Datasets: EMNIST

The datasets is an extended version of MNIST, containing letters and digits. It has *26* classes (digits and letters).

```
from torchvision import datasets, transforms
from torch.utils.data import DataLoader

transform = transforms.ToTensor()

trainset = datasets.EMNIST(root="./data",
    split="letters", train=True,
    download=True, transform=transform)
testset  = datasets.EMNIST(root="./data",
    split="letters", train=False,
    download=True, transform=transform)
```

Suggested Datasets: CIFAR-100

The dataset is consists in Natural RGB images: $3 \times 32 \times 32$.

It is a bigger version of CIFAR-10 seen during class, it consists of *100* classes.

```
from torchvision import datasets, transforms
from torch.utils.data import DataLoader

transform = transforms.ToTensor()

trainset = datasets.CIFAR100(root="./data",
    train=True, download=True, transform=transform)
testset  = datasets.CIFAR100(root="./data",
    train=False, download=True, transform=transform)
```

Suggestion: build a deeper (more layer) network.

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