Assignment 1 (Due: 2023/09/10 23:59)

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q1. (15%) Install and play with the **PyTorch** package

q2. (25%) MLP Training

1. **Train** an MLP with the **given** model structure and the **default** training set provided by the torchvision MNIST dataset.
2. Download your testing data from here

```
import json

with open('0_data.json', 'r') as f:
  data = json.load(f)
```

3. Convert testing data to images.
4. Forward the testing data.
5. Concatenate all `y_pred` into one flattened array.
6. Save the `y_pred` of your test images as a json file.

```
class MLP(nn.Module):
    def __init__(self, input_dim, output_dim):
        super().__init__()

        self.input_fc = nn.Linear(input_dim, 250)
        self.hidden_fc = nn.Linear(250, 100)
        self.output_fc = nn.Linear(100, output_dim)

    def forward(self, x):
        # x = [batch size, height, width]
        batch_size = x.shape[0]
        x = x.view(batch_size, -1)
        # x = [batch size, height * width]
        h_1 = F.relu(self.input_fc(x))
        # h_1 = [batch size, 250]
        h_2 = F.relu(self.hidden_fc(h_1))
        # h_2 = [batch size, 100]
        y_pred = self.output_fc(h_2)
        # y_pred = [batch size, output dim]
        return y_pred
```

The accuracy of **q2** will **not** affect the score, while please provide a detailed description of parameter settings and implementation in **q3**.

q3. (15%) Write down your experiment setting in English. The setting should include but not limit to (1) hardware specification, (2) package version, (3) testing images and (3) all the experiment parameters and details in **q2**.

The font size is 12, and the page limit is 1 page.

Submission Guideline

Please compress your files named `{SID}_a1.zip` (SID in upper case) to the COOL System, such as `D111111_a1.zip`, with two required files

file 1. `{SID}_a1.json`

Please store your outputs of **q2** as follows.
Notes: To dump the pickle object, all objects must be serialized first.

```
result = {
  'Q2_result': y_pred,
}
```

files 2. `{SID}_a1_report.pdf`

Supplementary Materials

PyTorch installation: https://pytorch.org/