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```
import torch
import torch.nn as nn
import torch.nn.functional as F
from torch.utils.data import Dataset, DataLoader
from sklearn.model_selection import train_test_split

import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
```

```
class Model(nn.Module):
    def __init__(self, in_features=4, h1=10, h2=11, out_features=3):
        super().__init__()
        self.fc1 = nn.Linear(in_features,h1)
        self.fc2 = nn.Linear(h1, h2)
        self.out = nn.Linear(h2, out_features)

    def forward(self, x):
        x = F.relu(self.fc1(x))
        x = F.relu(self.fc2(x))
        x = self.out(x)
        return x
```

```
torch.manual_seed(32)
model = Model()
```

```
df = pd.read_csv('iris.csv')
df.head()
```

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
0	5.1	3.5	1.4	0.2	0.0
1	4.9	3.0	1.4	0.2	0.0
2	4.7	3.2	1.3	0.2	0.0
3	4.6	3.1	1.5	0.2	0.0
4	5.0	3.6	1.4	0.2	0.0

Next steps: Generate code with df | View recommended plots | New interactive sheet

```
X = df.drop('target',axis=1).values
y = df['target'].values

X_train, X_test, y_train, y_test = train_test_split(X,y,test_size=0.2,random_state=33)

X_train = torch.FloatTensor(X_train)
X_test = torch.FloatTensor(X_test)
```

```
y_train = torch.LongTensor(y_train)
y_test = torch.LongTensor(y_test)
```

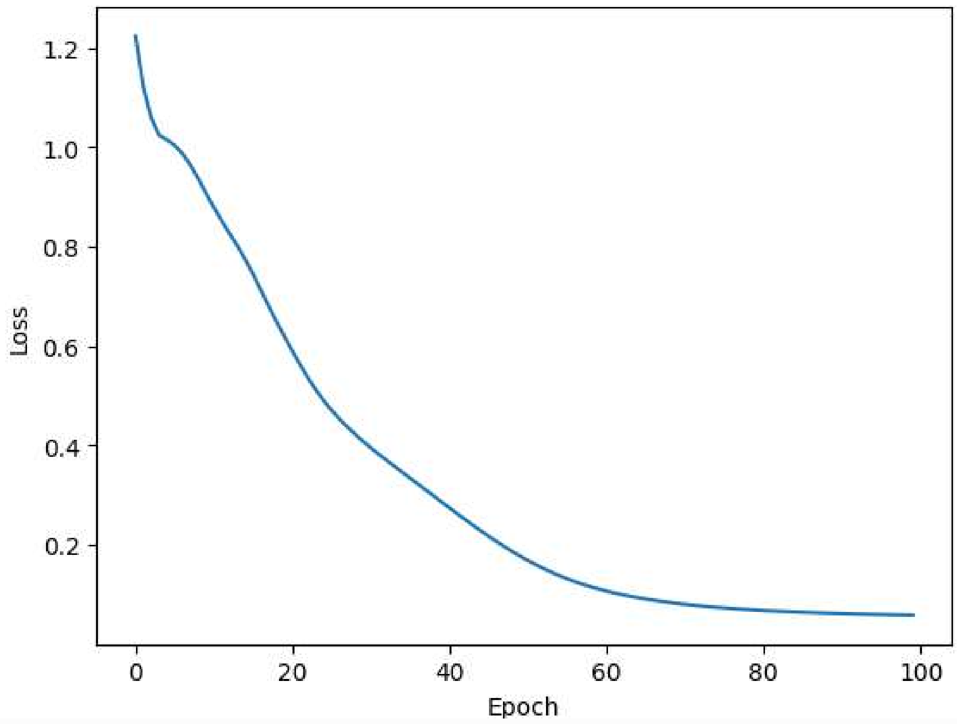
```
torch.manual_seed(4)
model = Model()
```

```
criterion = nn.CrossEntropyLoss()
optimizer = torch.optim.Adam(model.parameters(), lr=0.01)
```

```
epochs = 100
losses = []

for i in range(epochs):
    i+=1
    y_pred = model.forward(X_train)
    loss = criterion(y_pred, y_train)
    losses.append(loss)

    # a neat trick to save screen space:
    if i%10 == 1:
        print(f'epoch: {i:2}  loss: {loss.item():10.8f}')

    optimizer.zero_grad()
    loss.backward()
    optimizer.step()
```

```
epoch:  1  loss: 1.22303259
epoch: 11  loss: 0.87833655
epoch: 21  loss: 0.58939141
epoch: 31  loss: 0.39461419
epoch: 41  loss: 0.27418667
epoch: 51  loss: 0.16842622
epoch: 61  loss: 0.10710016
epoch: 71  loss: 0.08045476
epoch: 81  loss: 0.06811187
epoch: 91  loss: 0.06185398
```

```
import numpy as np
import matplotlib.pyplot as plt

# Convert each tensor in the list to a NumPy array
losses_np = np.array([loss.detach().cpu().numpy() if hasattr(loss, "detach") else loss for loss in losses])

plt.plot(range(epochs), losses_np)
plt.ylabel('Loss')
plt.xlabel('Epoch')
plt.show()
```



```
with torch.no_grad():
    y_val = model.forward(X_test)
    loss = criterion(y_val, y_test)
print(f'{loss:.8f}')
```

```
0.06247779
```

```
torch.save(model.state_dict(), 'IrisDatasetModel.pt')
```

```
new_model = Model()
new_model.load_state_dict(torch.load('IrisDatasetModel.pt'))
new_model.eval()
```

```
Model(
  (fc1): Linear(in_features=4, out_features=8, bias=True)
  (fc2): Linear(in_features=8, out_features=9, bias=True)
  (out): Linear(in_features=9, out_features=3, bias=True)
)
```

```
with torch.no_grad():
    y_val = new_model.forward(X_test)
    loss = criterion(y_val, y_test)
print(f'{loss:.8f}')
```

```
0.06247779
```

```
mystery_iris = torch.tensor([5.6,3.7,2.2,0.5])
```

```
with torch.no_grad():
    print(new_model(mystery_iris))
    print()
    print(labels[new_model(mystery_iris).argmax()])
```

```
tensor([ 12.2112,   7.1279, -19.5248])

Iris setosa
```