Linear Regression with PyTorch

August 11, 2021

[1]:
```
import torch
import torch.nn as nn
import numpy as np
import matplotlib.pyplot as plt
```

[2]:
```
# Hyper-parameters
input_size = 1
output_size = 1
num_epochs = 60
learning_rate = 0.001
```

[3]:
```
# Toy dataset
x_train = np.array([[3.3], [4.4], [5.5], [6.71], [6.93], [4.168],
                    [9.779], [6.182], [7.59], [2.167], [7.042],
                    [10.791], [5.313], [7.997], [3.1]], dtype=np.float32)

y_train = np.array([[1.7], [2.76], [2.09], [3.19], [1.694], [1.573],
                    [3.366], [2.596], [2.53], [1.221], [2.827],
                    [3.465], [1.65], [2.904], [1.3]], dtype=np.float32)
```

[4]:
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# Linear regression model
model = nn.Linear(input_size, output_size)
```

[5]:
```
# Loss and optimizer
criterion = nn.MSELoss()
optimizer = torch.optim.SGD(model.parameters(), lr=learning_rate)
```

[6]:
```
# Train the model
for epoch in range(num_epochs):
    # Convert numpy arrays to torch tensors
    inputs = torch.from_numpy(x_train)
    targets = torch.from_numpy(y_train)

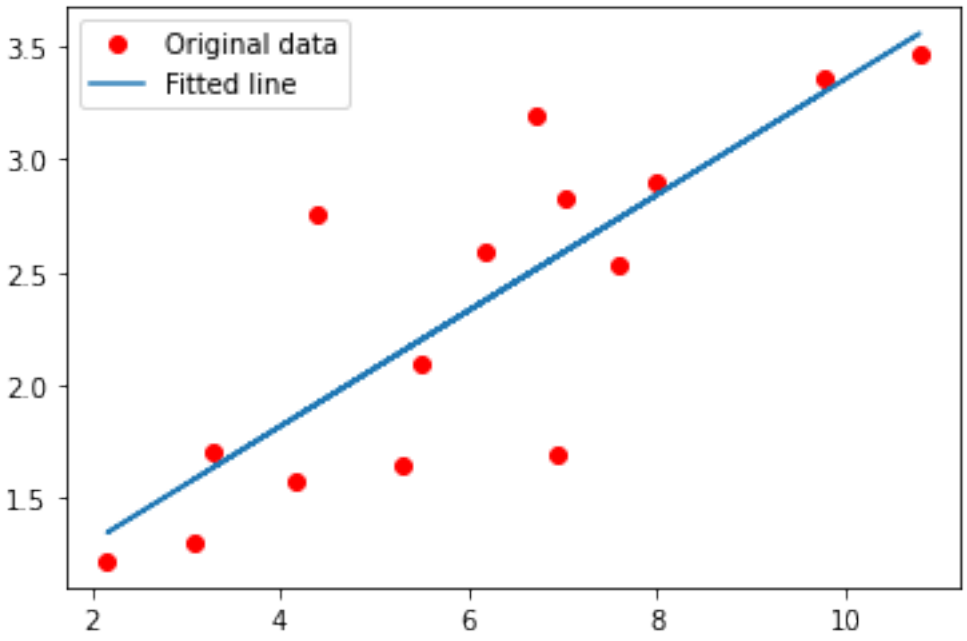
    # Forward pass
    outputs = model(inputs)
    loss = criterion(outputs, targets)
```

```
    # Backward and optimize
    optimizer.zero_grad()
    loss.backward()
    optimizer.step()

    if (epoch+1) % 5 == 0:
        print ('Epoch [{}/{}], Loss: {:.4f}'.format(epoch+1, num_epochs, loss.
↪item()))
```

```
Epoch [5/60], Loss: 8.0336
Epoch [10/60], Loss: 3.3552
Epoch [15/60], Loss: 1.4599
Epoch [20/60], Loss: 0.6920
Epoch [25/60], Loss: 0.3810
Epoch [30/60], Loss: 0.2550
Epoch [35/60], Loss: 0.2039
Epoch [40/60], Loss: 0.1832
Epoch [45/60], Loss: 0.1749
Epoch [50/60], Loss: 0.1715
Epoch [55/60], Loss: 0.1701
Epoch [60/60], Loss: 0.1695
```

[7]:
```
# Plot the graph
predicted = model(torch.from_numpy(x_train)).detach().numpy()
plt.plot(x_train, y_train, 'ro', label='Original data')
plt.plot(x_train, predicted, label='Fitted line')
plt.legend()
plt.show()
```



[8]:
```
# Save the model checkpoint
torch.save(model.state_dict(), 'model.ckpt')
```