03.3-Regresion Lineal PyTorch

November 18, 2019

In [1]:
```
from pylab import *
```

In [2]:
```
from sklearn.datasets import load_boston
```

In [3]:
```
boston_dataset = load_boston()
```

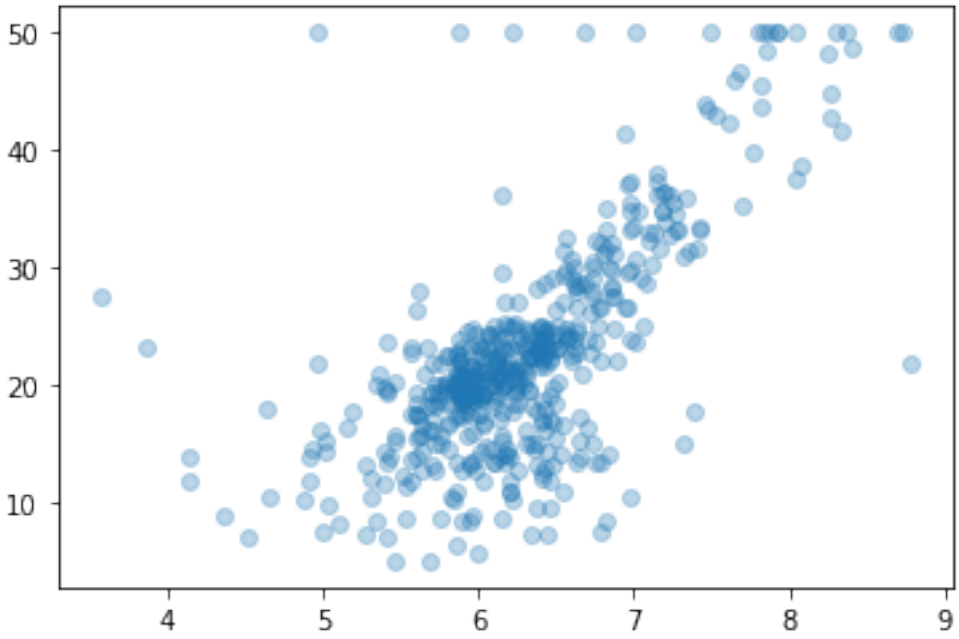
In [4]:
```
import pandas as pd
```

In [5]:
```
boston = pd.DataFrame(boston_dataset.data, columns=boston_dataset.feature_names)
boston['MEDV'] = boston_dataset.target
boston.head()
```

Out[5]:

	CRIM	ZN	INDUS	CHAS	NOX	RM	AGE	DIS	RAD	TAX	PTRATIO	B	LSTAT	MEDV
0	0.00632	18.0	2.31	0.0	0.538	6.575	65.2	4.0900	1.0	296.0	15.3	396.90	4.98	24.0
1	0.02731	0.0	7.07	0.0	0.469	6.421	78.9	4.9671	2.0	242.0	17.8	396.90	9.14	21.6
2	0.02729	0.0	7.07	0.0	0.469	7.185	61.1	4.9671	2.0	242.0	17.8	392.83	4.03	34.7
3	0.03237	0.0	2.18	0.0	0.458	6.998	45.8	6.0622	3.0	222.0	18.7	394.63	2.94	33.4
4	0.06905	0.0	2.18	0.0	0.458	7.147	54.2	6.0622	3.0	222.0	18.7	396.90	5.33	36.2

In [6]:
```
scatter(boston['RM'], boston['MEDV'], alpha=0.3)
show()
```

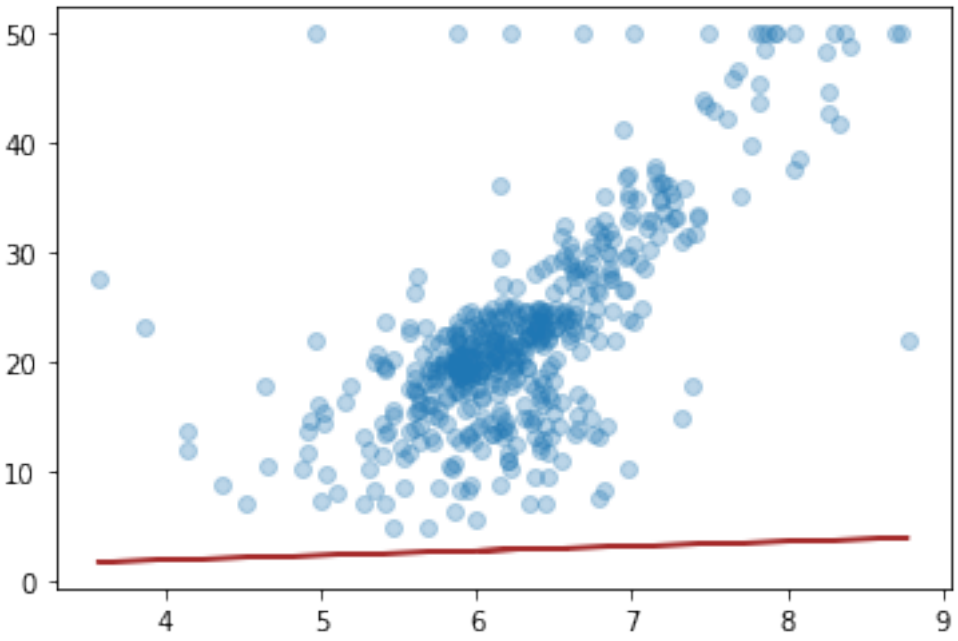



```
In [7]: X = array(boston['RM'])
        Y = array(boston['MEDV'])

In [8]: import torch

In [9]: print(X.shape, Y.shape)

(506,) (506,)


In [10]: X = torch.Tensor(X.reshape(506, 1))
         Y = torch.Tensor(Y.reshape(506, 1))

In [11]: print(X.shape, Y.shape)

torch.Size([506, 1]) torch.Size([506, 1])


In [12]: class LinearRegretion(torch.nn.Module):
             def __init__(self, input_dim):
                 super().__init__()

                 self.F = torch.nn.Linear(input_dim, 1)
                 self.loss = None
                 self.accuracy = None

             def forward(self, x):
```

```
            return self.F(x)

        def fit(self, x, y, epochs=1, lr=0.01):
            loss_fn = torch.nn.MSELoss()
            optimizer = torch.optim.SGD(self.parameters(), lr=lr)

            self.train()

            for i in range(0, epochs):
                y_ = self.forward(x)
                loss = loss_fn(y_, y)

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

            self.loss = loss.detach().numpy()
            self.accuracy = self.loss / x.shape[0]
```

In [13]:
```
h = LinearRegretion(1)
```

In [14]:
```
hy = h(X).detach()
scatter(X, Y, alpha=0.3)
plot(X, hy, c="brown")
show()
```



In [15]:
```
print(h.F.weight)
```

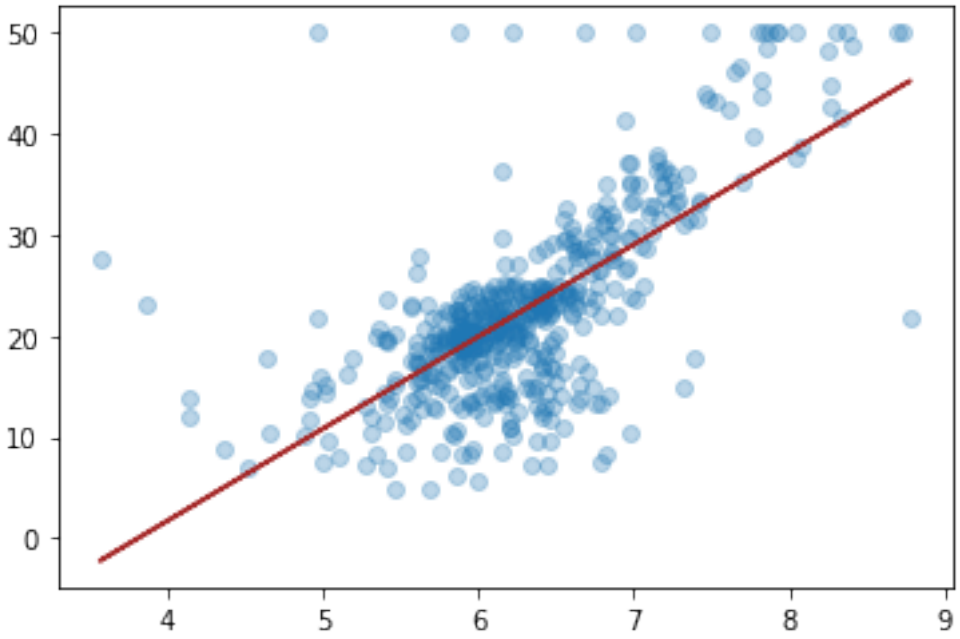
```
Parameter containing:
tensor([[0.4203]], requires_grad=True)
```

```
In [16]: print(h.F.bias)
```

```
Parameter containing:
tensor([0.2636], requires_grad=True)
```

```
In [17]: h.fit(X, Y, epochs=100000, lr=0.003)
```

```
         hy = h(X).detach()
         scatter(X, Y, alpha=0.3)
         plot(X, hy, c="brown")
         show()
```




```
In [18]: for param in h.parameters():
             print(param)
```

```
Parameter containing:
tensor([[9.0979]], requires_grad=True)
Parameter containing:
tensor([-34.6439], requires_grad=True)
```

```
In [19]: print(h.F.weight)
```

```
Parameter containing:
tensor([[9.0979]], requires_grad=True)
```

```
In [20]: print(h.F.bias)
```

```
Parameter containing:
tensor([-34.6439], requires_grad=True)
```

```
In [21]: print("Loss: ", h.loss)
         print("Accuracy: ", h.accuracy)
```

```
Loss:  43.60056
Accuracy:  0.08616711311189554
```

```
In [22]: print((h(torch.Tensor([6]))*1000).detach().numpy())
```

```
[19943.55]
```

```
In [23]: print(h)
```

```
LinearRegretion(
  (F): Linear(in_features=1, out_features=1, bias=True)
)
```

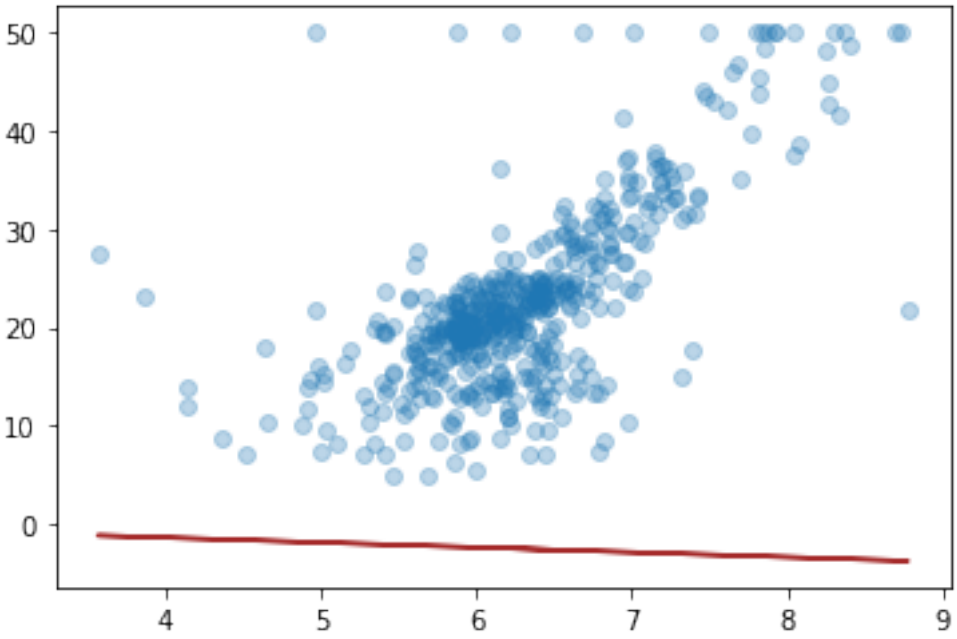
```
In [24]: print(h.state_dict())
```

```
OrderedDict([('F.weight', tensor([[9.0979]])), ('F.bias', tensor([-34.6439]))])
```

```
In [25]: torch.save(h.state_dict(), "linear_state_dict.pt")
```

```
In [26]: other_model = LinearRegretion(1)
```

```
In [27]: hy = other_model(X).detach()
         scatter(X, Y, alpha=0.3)
         plot(X, hy, c="brown")
         show()
```




```
In [28]: other_model.load_state_dict(torch.load("linear_state_dict.pt"))
```

```
Out[28]: <All keys matched successfully>
```

```
In [29]: hy = other_model(X).detach()
         scatter(X, Y, alpha=0.3)
         plot(X, hy, c="brown")
         show()
```