Making Predictions with Logistic Regression in PyTorch

How to make predictions with logistic regression in pytorch

The logistic function and its implementation on tensors

How to build a logistic regression model with nn.Sequential

How to build a custom module for logistic regression

Create Data Class

Build the model with nn.Module

Train with Mini-Batch Gradient Descent

Plot the Progress

What is a logistic Function?

When we build a classifier, we wish it can return either 0 or 1. A sigmoid or logistic function can be used in this case as this function always return a value between 0 and 1. Usually we will set a threshold, such as 0.5 to round up or round down the result to designate the output to one class or another.

In [2]:
```
pip install torch
```

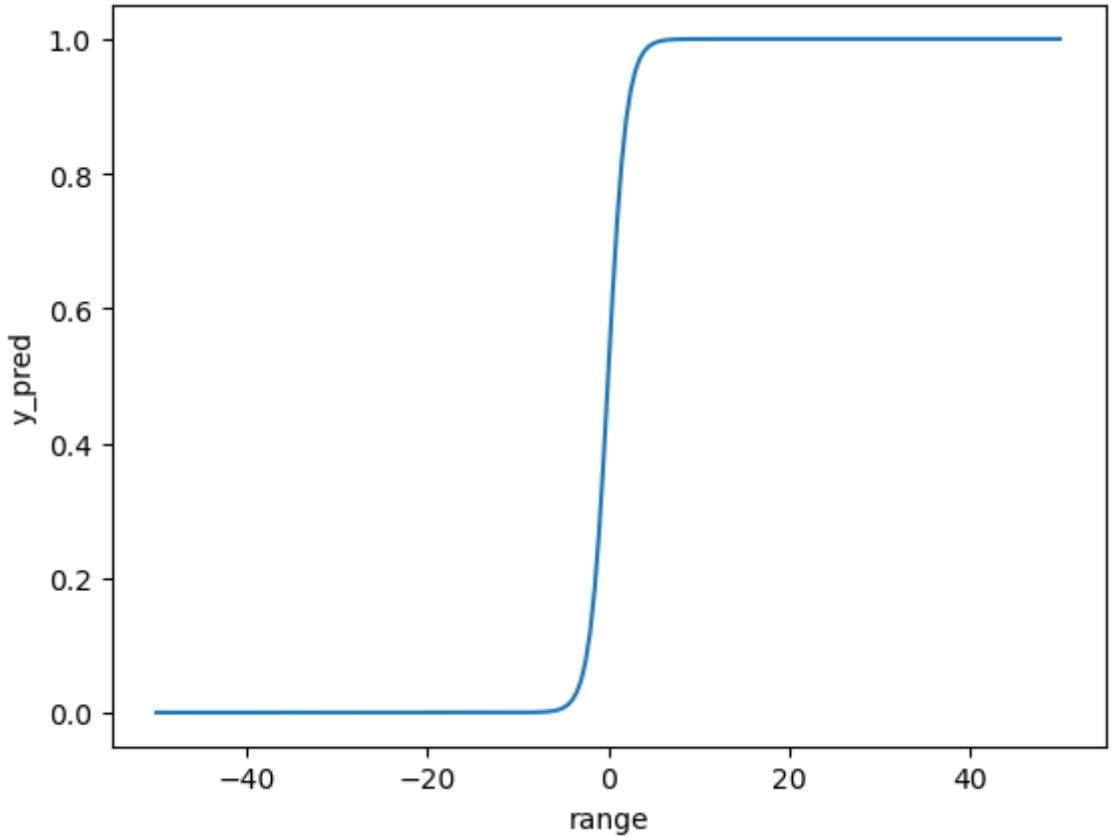
```
Collecting torchNote: you may need to restart the kernel to use updated packages.

  Downloading torch-2.0.1-cp39-cp39-win_amd64.whl (172.4 MB)
     ---------------------------------------- 172.4/172.4 MB 2.6 MB/s eta 0:00:00
Requirement already satisfied: filelock in c:\users\kiran\anaconda3\lib\site-packages (from torch) (3.6.0)
Requirement already satisfied: typing-extensions in c:\users\kiran\anaconda3\lib\site-packages (from torch) (4.3.0)
Requirement already satisfied: sympy in c:\users\kiran\anaconda3\lib\site-packages (from torch) (1.10.1)
Requirement already satisfied: networkx in c:\users\kiran\anaconda3\lib\site-packages (from torch) (2.8.4)
Requirement already satisfied: jinja2 in c:\users\kiran\anaconda3\lib\site-packages (from torch) (2.11.3)
Requirement already satisfied: MarkupSafe>=0.23 in c:\users\kiran\anaconda3\lib\site-packages (from jinja2->torch) (2.0.1)
Requirement already satisfied: mpmath>=0.19 in c:\users\kiran\anaconda3\lib\site-packages (from sympy->torch) (1.2.1)
Installing collected packages: torch
Successfully installed torch-2.0.1
WARNING: Ignoring invalid distribution -rotobuf (c:\users\kiran\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\kiran\anaconda3\lib\site-packages)

[notice] A new release of pip is available: 23.1.2 -> 23.2
[notice] To update, run: python.exe -m pip install --upgrade pip
```

In [4]:
```python
import torch
torch.manual_seed(42)
xrange=torch.range(-50,50,0.5)
sig_func=torch.nn.Sigmoid()
y_pred=sig_func(xrange)
```

```
C:\Users\KIRAN\AppData\Local\Temp\ipykernel_25192\3128882958.py:3: UserWarning: torch.range is deprecated and will be removed in a future release because its behavior is inconsistent with Python's range builtin. Instead, use torch.arange, which produces values in [start, end).
  xrange=torch.range(-50,50,0.5)
```

Let`s see how the plot looks like

In [5]:
```python
import matplotlib.pyplot as plt
plt.plot(xrange.numpy(),y_pred.numpy())
plt.xlabel('range')
plt.ylabel('y_pred')
plt.show()
```



Logistic Regression Model via nn.Sequential

In [6]:
```
#let`s define a logistic regression model object that takes one-dimensional tensor as input
log_regr=torch.nn.Sequential(torch.nn.Linear(1,1),torch.nn.Sigmoid())
```

In [9]:
```
# we can check the list of model parameters using parameters() method.
print(list(log_regr.parameters()))
```

```
[Parameter containing:
tensor([[0.7645]], requires_grad=True), Parameter containing:
tensor([0.8300], requires_grad=True)]
```

In [11]:
```
# now let`s define a one-dimensional tensor x and make predictions with our logistic regression model

x=torch.tensor([[1],[2],[3],[4]],dtype=torch.float32)
```

In [12]:
```
y_pred=log_regr(x)
print('here is model prediction', y_pred)
```

```
here is model prediction tensor([[0.8313],
        [0.9137],
        [0.9579],
        [0.9799]], grad_fn=<SigmoidBackward0>)
```

Custom Module for Logistic Regression

In [17]:
```
# build custom module for logistic regression

class LogisticRegression(torch.nn.Module):
    #build the constructor
    def __init__(self,n_inputs):
        super(LogisticRegression,self).__init__()
        self.linear=torch.nn.Linear(n_inputs,1)

        #make predictions
    def forward(self,x):
        y_pred=torch.sigmoid(self.linear(x))
        return y_pred
```

In [18]:
```
log_regr_cus=LogisticRegression(1)
```

In [19]:
```
y_pred=log_regr_cus(x)
print('here is model prediction',y_pred)
```

```
here is model prediction tensor([[0.4957],
        [0.4412],
        [0.3880],
        [0.3375]], grad_fn=<SigmoidBackward0>)
```

In [ ]: