Train-Test

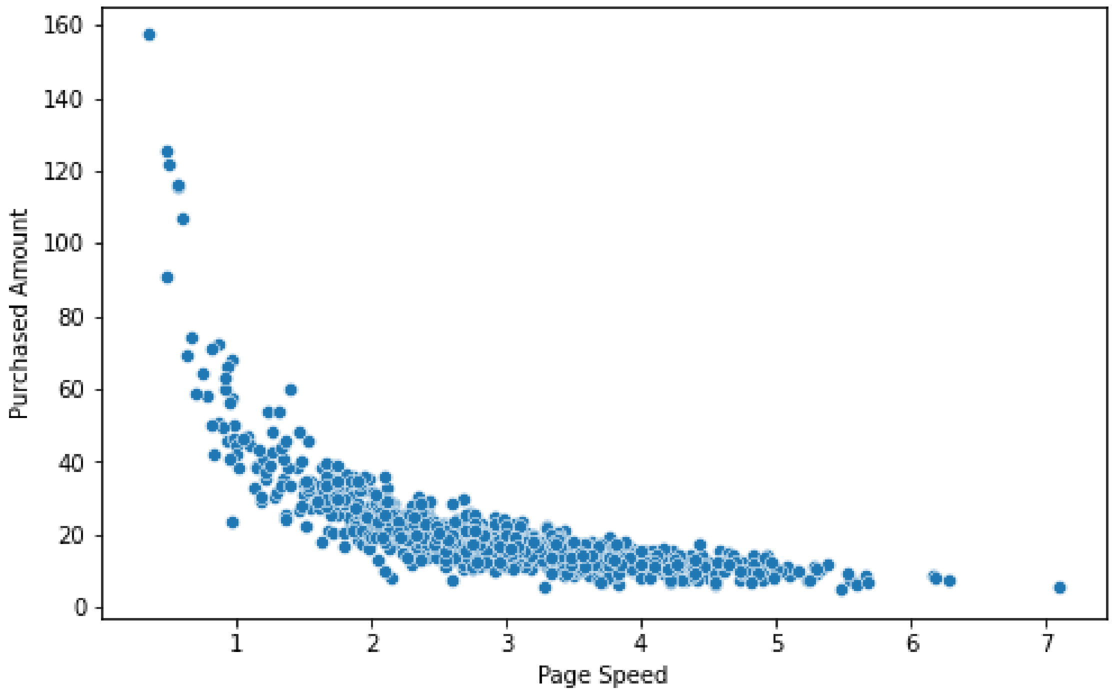
September 2, 2021

[20]:

```
%matplotlib inline
from pylab import *
import numpy as np
import seaborn as sns
import pandas as pd

np.random.seed(2)
#For example, let's say we work for an e-commerce company, and they are␣
↪interested in finding a correlation between
#page speed (how fast each web page renders for a customer) and how much a␣
↪customer spends.

#First, let's just make page speed and purchase amount totally random
#generating normally distrubuted random data

#Normally distributed dat with mean 3 i.e data centered arround 3 with standard␣
↪deviation 1 and
#total 1000 data point
pageSpeeds = np.random.normal(3.0, 1.0, 1000)
#Now we'll make our fabricated purchase amounts an actual function of page␣
↪speed, making a very real correlation.
#making purchaseAmount function of pageSpeed
purchaseAmount = np.random.normal(50.0, 10.0, 1000) / pageSpeeds
```

[21]:

```
plt.figure(figsize=(8,5))
sns.scatterplot(x=pageSpeeds,y=purchaseAmount)
plt.xlabel('Page Speed') #x label
plt.ylabel('Purchased Amount') #y label
plt.show()
```

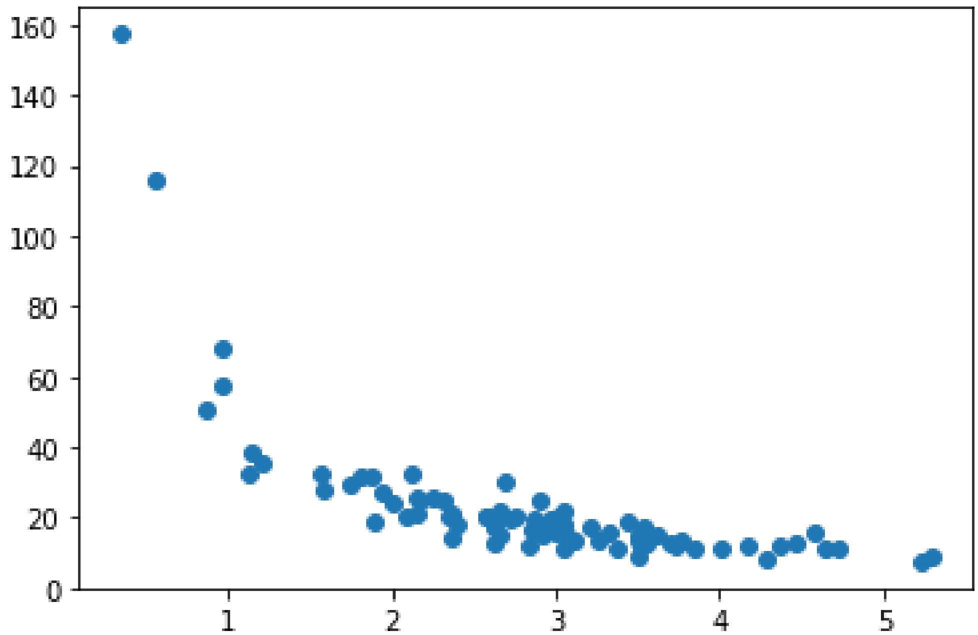


Now we'll split the data in two - 80

[33]:
```
#Evert=y thing before 80 i.e 80%
trainX = pageSpeeds[:80]
#everything afer 80% ie. 20%
testX = pageSpeeds[80:]

trainY = purchaseAmount[:80]
testY = purchaseAmount[80:]
```

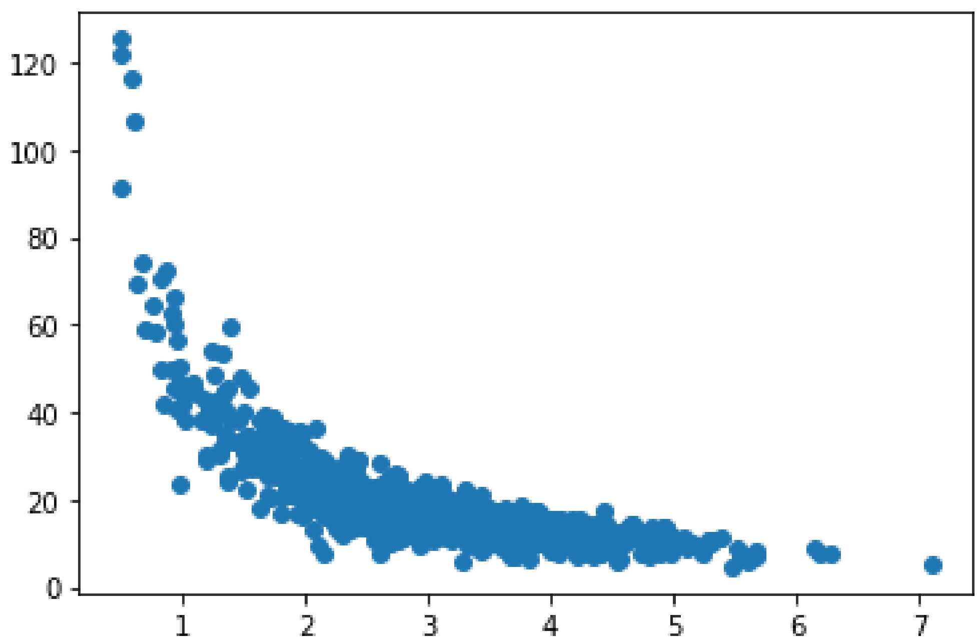
[34]:
```
scatter(trainX,trainY)
```

[34]: <matplotlib.collections.PathCollection at 0x7fd5543e9b20>



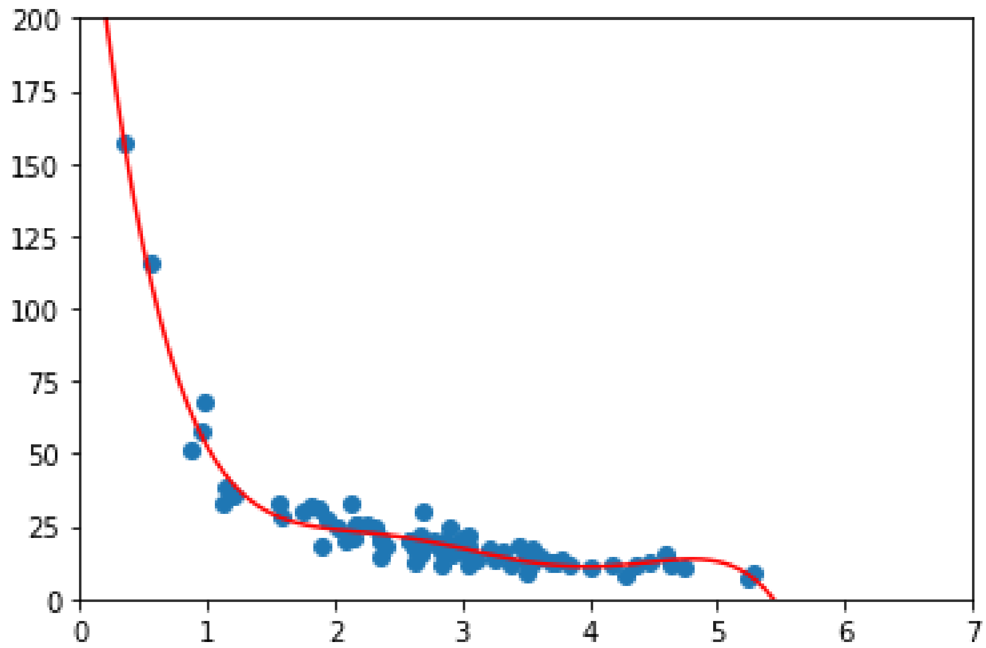
[35]:
```
scatter(testX,testY)
```

[35]: <matplotlib.collections.PathCollection at 0x7fd55315b700>



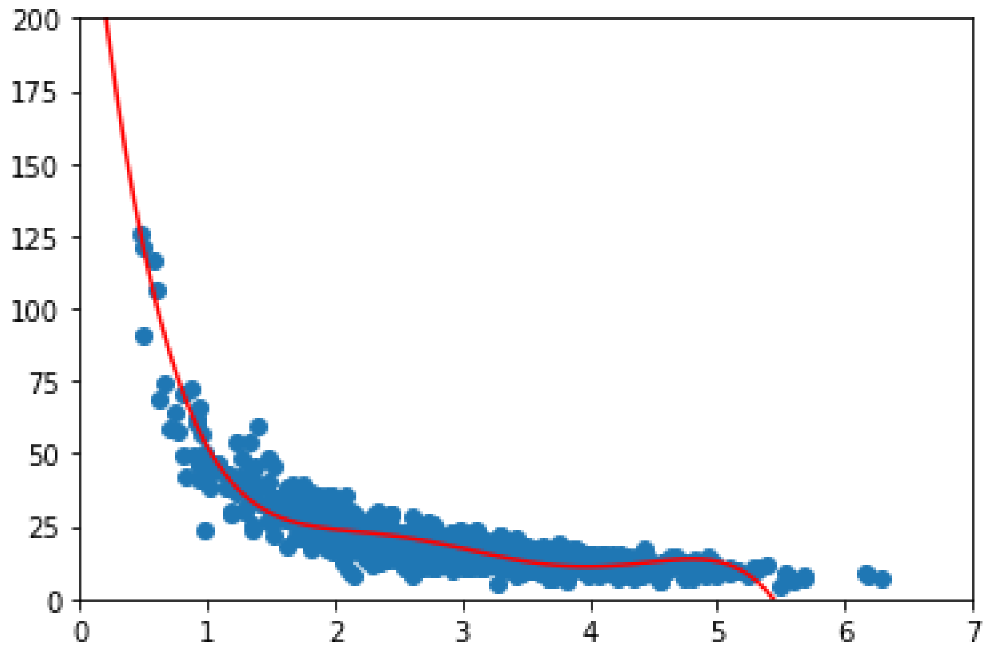
[48]:
```
#numpy has a handy polyfit function we can use, to let us construct an␣
↪nth-degree polynomial model
#of our data that minimizes squared error.
#Let's try it with a 8th degree polynomial:

#x, y axis is array of pageSpeed and Purchase Amount on TRAINING DATA
x = np.array(trainX)
y = np.array(trainY)

#np.polyfit(x,y,8) -> we want 8th Degree of Polynomial Fit to this data

#The polynomial's coefficients, in decreasing powers,
#For example, poly1d([1, 2, 3]) returns an object that represents Xsqure2+2X+1
p4=np.poly1d(np.polyfit(x,y,5))

#p4 funcation help to Predict new value
```

[49]:
```
#We'll visualize our original scatter plot, together with a plot of our␣
↪predicted values using the polynomial
#for page speed times ranging from 0-7 seconds:

import matplotlib.pyplot as plt

#100 data point between 0-7 sec
xp = np.linspace(0, 7, 100)
axes = plt.axes()
axes.set_xlim([0,7])
axes.set_ylim([0, 200])
plt.scatter(x, y)
#P4(xp) -> Predicted Y value for each xp value
#plotting x and y [x=xp] and [y=p4(xp)]
plt.plot(xp, p4(xp), c='r')
plt.show()
```



[50]:

```
#We'll visualize our original scatter plot, together with a plot of our␣
↪predicted values using the polynomial
#for page speed times ranging from 0-7 seconds:

import matplotlib.pyplot as plt

#x, y axis is array of pageSpeed and Purchase Amount on TRAINING DATA
testx = np.array(testX)
testy = np.array(testY)

#100 data point between 0-7 sec
xp = np.linspace(0, 7, 100)
axes = plt.axes()
axes.set_xlim([0,7])
axes.set_ylim([0, 200])
plt.scatter(testx, testy)
#P4(xp) -> Predicted Y value for each xp value
#plotting x and y [x=xp] and [y=p4(xp)]
plt.plot(xp, p4(xp), c='r')
plt.show()
```



Doesn't look that bad when you just eyeball it, but the r-squared score on the test data is kind of horrible! This tells us that our model isn't all that great...

[51]:
```
from sklearn.metrics import r2_score
r2=r2_score(testY,p4(testX))
r2
```

[51]: -2.801401762847181

...even though it fits the training data better: because model is created on Traing Data

[52]:
```
from sklearn.metrics import r2_score

r2 = r2_score(trainY, p4(trainX))

print(r2)
```

```
0.9584754747722157
```

[ ]:
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