689 Homework 1 Part 2

Report
Animesh Sengupta

Q6

a - The risk for the training data with θ = [1, 1..., 1] is **4.689596400196879**

b - The gradient vector of risk with θ = [1, 1..., 1] is **[0.83104621, 1.1705249 1.07839678, 0.86892169, 0.95695649 , 0.94785829 ,1.0144125 , 0.88121832, 0.90573908, -0.55376932, -0.18509614, -0.06564822,-0.03534974, -0.01394138, -0.04992698, -0.00741326 0.06708419, -0.05207442, -0.79419585]**

c- model fit output

```
At X0         0 variables are exactly at the bounds

At iterate    0    f=  2.19682D+00    |proj g|=  2.80975D+00

At iterate    1    f=  3.30477D-01    |proj g|=  8.39046D-01

At iterate    2    f=  1.03890D-01    |proj g|=  1.09825D-01

This problem is unconstrained.

Output exceeds the size limit. Open the full output data in a text editor

At iterate    3    f=  8.76290D-02    |proj g|=  1.24406D-01

At iterate    4    f=  4.37880D-02    |proj g|=  1.28700D-01

At iterate    5    f=  2.65265D-02    |proj g|=  6.61926D-02

At iterate    6    f=  1.66309D-02    |proj g|=  2.21279D-02

At iterate    7    f=  1.63150D-02    |proj g|=  1.81423D-02

At iterate    8    f=  1.59837D-02    |proj g|=  1.01984D-02

At iterate    9    f=  1.54625D-02    |proj g|=  1.06462D-02

At iterate   10    f=  1.39918D-02    |proj g|=  2.46852D-02
```

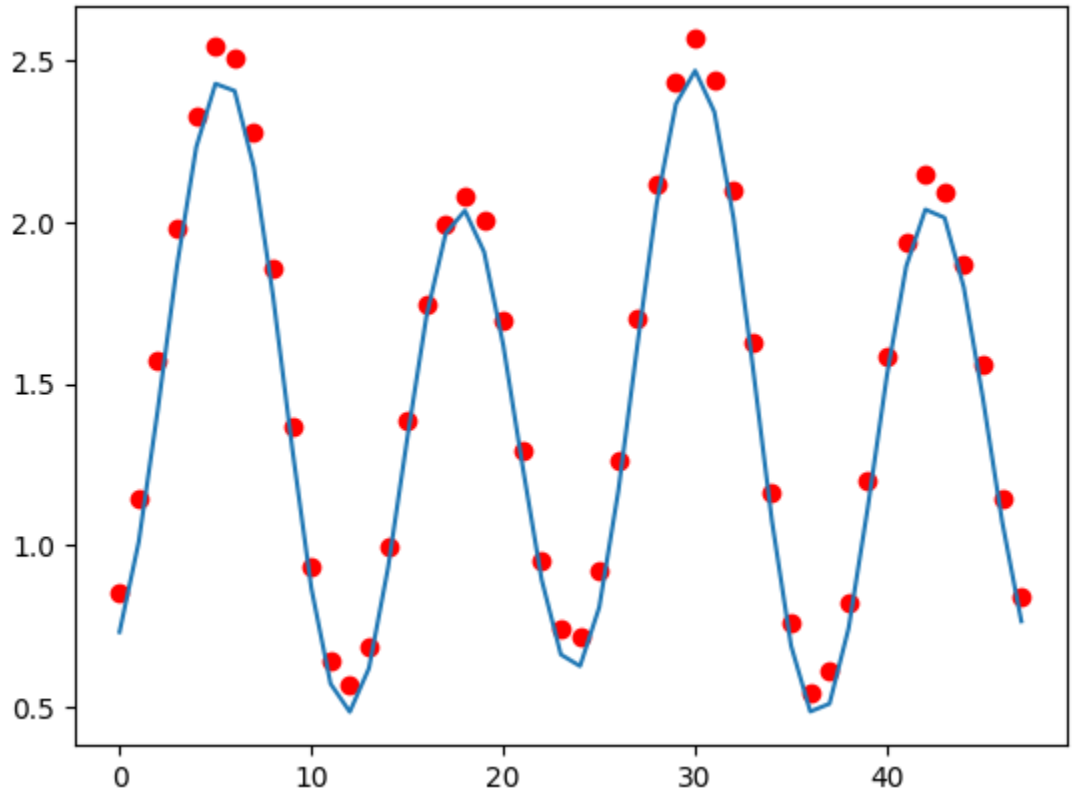
```
At iterate   11    f=  1.17935D-02    |proj g|=  4.26310D-02

At iterate   12    f=  9.61433D-03    |proj g|=  4.32796D-02

At iterate   13    f=  8.10246D-03    |proj g|=  2.91300D-02

At iterate   14    f=  5.16877D-03    |proj g|=  1.05896D-02

...
 19    35    39     1    0    0  2.509D-04   3.872D-03
 F =   3.8723924137015172E-003

CONVERGENCE: REL_REDUCTION_OF_F_<=_FACTR*EPSMCH
```

D. The average squared loss of the model for training and test is equivalent to its empirical risk i.e

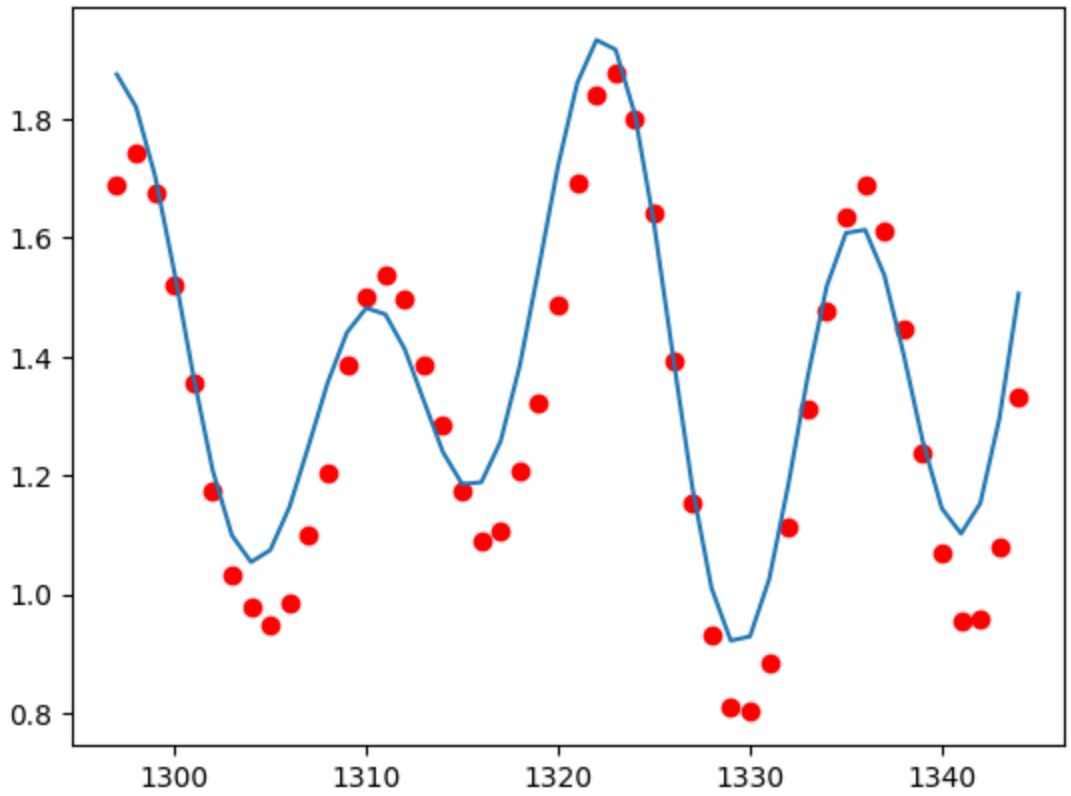
Training loss:0.003872392413701517

Test loss:0.012063498103037053

e- First 48 hours plot of actual vs predicted training data



F. last 48 hours of actual vs predicted test data


1.8
1.6
1.4
1.2
1.0
0.8
1300
1310
1320
1330
1340