

## 第一題

Sample input and output 1:

```
> setwd('your_path_to_data')
> load(file='rtb2_train.rdata')
>
> nfeat=20
> rtb3 = rtb2_train[1:(nfeat+1)]
> y=as.matrix(rtb3[,1])
> xmat = model.matrix(paying_price~., data=rtb3)
> lmev1 = lm_evmax(y, xmat)
> lmev1
$mN
      [,1]
(Intercept)  98.940003
agent_1      43.452779
agent_2     114.194678
agent_3       6.546850
agent_4     -15.585023
agent_5       1.861286
agent_6       6.272122
agent_7     17.879145
agent_8       5.386818
agent_9     -12.751464
agent_10     -3.897753
agent_11     -7.807724
agent_12     -2.450378
agent_13     -4.953377
agent_14      5.720329
agent_15      8.330334
agent_16      9.683872
agent_17      1.678195
agent_18     -5.640699
agent_19     -9.099482
agent_20     -7.276850

$mNsd
(Intercept)  agent_1  agent_2  agent_3  agent_4  agent_5
  3.0069519  5.6476653  4.3677002  5.3702176  3.7473316  3.2040479
 agent_6  agent_7  agent_8  agent_9  agent_10  agent_11
  7.7447867  7.5544160  6.3807694  3.9323111  0.6219326  1.0473609
 agent_12  agent_13  agent_14  agent_15  agent_16  agent_17
  2.9611644  24.2577922  24.7049856  11.4733189  5.3802582  3.8772171
 agent_18  agent_19  agent_20
  3.6513938  2.4602313  3.0162630

$alpha
[1] 0.0007585334

$beta
[1] 0.0002535907
```

Sample input and output 2:

```
> setwd('your_path_to_data')
> load(file='rtb2_train.rdata')
>
> nfeat=seq(1, length(rtb2_train), by = 50)
> rtb3 = rtb2_train[1:10000,nfeat]
> y=as.matrix(rtb3[,1])
> xmat = model.matrix(paying_price~., data=rtb3)
> lmev1 = lm_evmax(y, xmat)
> lmev1
$mn
      [,1]
(Intercept) 100.4746623
agent_50      23.9989154
agent_103     10.1661209
agent_158      4.0152298
user_10057    -8.2730481
url_16        93.3121575
url_66        81.8463466
url_116       31.2817635
url_166       -0.8603026
url_216      -34.0924458
url_266       -2.4143775
url_316       -9.3940372
url_366        0.0000000
url_416      -39.3719646
url_466       12.1002771
url_516        0.0000000
url_566      -51.1197825
url_616       38.0662713
url_666       15.5547205
url_716        0.0000000
url_766      -25.8986000
url_816      -12.8484806
url_866        0.0000000
url_916       13.3565615
url_966        0.0000000
url_1016       0.0000000
url_1066      17.9304917
url_1116       0.0000000
ad_slot_id_1  -41.9625696
ad_slot_id_51  13.9018210
ad_slot_id_101 -18.7161009
ad_slot_id_151  48.1721337
ad_slot_id_201  50.9356542
ad_slot_id_251  36.2176190
ad_slot_id_301 -26.3339373
ad_slot_id_351  48.9062658
ad_slot_id_401   7.1105256
ad_slot_id_451  40.8873052
ad_slot_id_501   1.1235210
ad_slot_id_551   0.0000000
ad_slot_id_601  11.9494554
ad_slot_id_651  14.1597390
ad_slot_id_701   0.0000000
ad_slot_id_751  -6.0277563
ad_slot_id_801   0.0000000
domain_46      93.9292211
domain_96       0.0000000
domain_146     -21.9054086
domain_196      0.0000000
domain_246     -35.7718424
```

```
domain_296      37.1511976
domain_346      12.4841041
domain_396       0.0000000
domain_446       0.0000000
domain_496     -45.7513904
domain_546      23.9505430
domain_596     -6.0277563
```

\$mNsd

```
(Intercept)      agent_50      agent_103
  0.7395494      36.9668295      15.3044794
  agent_158      user_10057      url_16
14.2334692      1.5408060      10.0267227
  url_66      url_116      url_166
20.3663730      23.2225682      15.6500783
  url_216      url_266      url_316
17.5278189      20.3483165      36.9668295
  url_366      url_416      url_466
47.0921028      31.4264629      36.9668295
  url_516      url_566      url_616
47.0921028      27.8077560      25.2068282
  url_666      url_716      url_766
36.9668295      47.0921028      36.9668295
  url_816      url_866      url_916
36.9668295      47.0921028      36.9700279
  url_966      url_1016      url_1066
47.0921028      47.0921028      27.8077560
  url_1116      ad_slot_id_1      ad_slot_id_51
47.0921028      1.4086725      9.3904425
ad_slot_id_101      ad_slot_id_151      ad_slot_id_201
  8.4988166      27.8078131      27.8077560
ad_slot_id_251      ad_slot_id_301      ad_slot_id_351
  37.4290376      16.8168606      31.4274864
ad_slot_id_401      ad_slot_id_451      ad_slot_id_501
  36.9668295      36.9668295      31.4264629
ad_slot_id_551      ad_slot_id_601      ad_slot_id_651
  47.0921028      18.3325956      31.4264629
ad_slot_id_701      ad_slot_id_751      ad_slot_id_801
  47.0921028      35.9756466      47.0921028
  domain_46      domain_96      domain_146
27.8077560      47.0921028      20.3504692
  domain_196      domain_246      domain_296
47.0921028      14.2344346      18.3314931
  domain_346      domain_396      domain_446
36.9668295      47.0921028      47.0921028
  domain_496      domain_546      domain_596
31.4264629      21.6436323      35.9756466
```

\$alpha

```
[1] 0.0004509245
```

\$beta

```
[1] 0.0002808903
```

Sample input and output 3:

```
> setwd('your_path_to_data')
> load(file='rtb2_train.rdata')
>
> nfeat=seq(1, length(rtb2_train), by = 40)
> rtb3 = rtb2_train[nfeat]
> y=as.matrix(rtb3[,1])
> xmat = model.matrix(paying_price~., data=rtb3)
> lmev1 = lm_evmax(y, xmat)
> lmev1
$mn
      [,1]
(Intercept) 101.8303051
agent_40      5.5743953
agent_83      5.5947415
agent_125     10.6661157
agent_169     10.3578175
user_10057    -8.1791712
url_6         -66.2230512
url_46        1.5576027
url_86        0.2777570
url_126       -41.9363424
url_166       0.5657763
url_206       76.1149315
url_246       -63.3886087
url_286       -2.1058737
url_326       -66.8040638
url_366       -50.9677890
url_406       21.0319846
url_446       23.6982830
url_486       -53.4864004
url_526       -54.8887971
url_566       -35.3463290
url_606       29.4451927
url_646       21.9037555
url_686       26.7658134
url_726       -39.6995136
url_766       -41.2170633
url_806       16.6345150
url_846       -0.9683541
url_886       -37.7251240
url_926       13.2015063
url_966       -0.4010260
url_1006      11.8001073
url_1046      -1.1483329
url_1086      16.3234474
url_1126     -25.9636938
ad_slot_id_1  -43.5619926
ad_slot_id_41 53.8150048
ad_slot_id_81 26.2868178
ad_slot_id_121 24.4938745
ad_slot_id_161 45.3188431
ad_slot_id_201 63.0783514
ad_slot_id_241 43.7227792
ad_slot_id_281 -67.4220541
ad_slot_id_321 18.5602285
ad_slot_id_361 -53.3867116
ad_slot_id_401 39.0282556
ad_slot_id_441 33.9341684
ad_slot_id_481 32.2024917
ad_slot_id_521 33.6725418
ad_slot_id_561 28.1672831
```

```

ad_slot_id_601 4.2477280
ad_slot_id_641 12.0960509
ad_slot_id_681 -15.3876196
ad_slot_id_721 -31.5397319
ad_slot_id_761 -26.1019424
ad_slot_id_801 12.8063012
domain_36 34.3981968
domain_76 76.3409977
domain_116 45.1823221
domain_156 11.7674655
domain_196 70.0786567
domain_236 59.8724013
domain_276 49.2132777
domain_316 52.0493728
domain_356 36.3970641
domain_396 24.2575258
domain_436 28.4953401
domain_476 21.1981910
domain_516 24.8800771
domain_556 1.9282454
domain_596 4.5977510

```

#### \$mNsd

```

(Intercept) agent_40 agent_83 agent_125 agent_169
0.2212939 2.4109330 4.5464215 8.6681913 13.7629440
user_10057 url_6 url_46 url_86 url_126
0.4519580 2.2436131 2.8679784 4.3383769 4.9913416
url_166 url_206 url_246 url_286 url_326
6.5218745 22.5325559 14.5249560 9.3761789 19.9057486
url_366 url_406 url_446 url_486 url_526
14.1181356 10.9506578 13.0768346 18.8956320 22.5326211
url_566 url_606 url_646 url_686 url_726
11.5439166 19.9058002 15.4562281 21.0975200 18.8955514
url_766 url_806 url_846 url_886 url_926
22.5325559 16.5932676 18.8970857 22.5326211 16.5932676
url_966 url_1006 url_1046 url_1086 url_1126
21.0986675 17.2647840 22.5335943 22.5325559 13.7439856
ad_slot_id_1 ad_slot_id_41 ad_slot_id_81 ad_slot_id_121 ad_slot_id_161
0.4255918 10.5940539 3.6342685 4.9076409 9.9993121
ad_slot_id_201 ad_slot_id_241 ad_slot_id_281 ad_slot_id_321 ad_slot_id_361
15.4568329 12.4984549 15.4561837 8.1691034 13.7439856
ad_slot_id_401 ad_slot_id_441 ad_slot_id_481 ad_slot_id_521 ad_slot_id_561
18.0251548 17.2647840 18.0250580 21.0975200 18.8955514
ad_slot_id_601 ad_slot_id_641 ad_slot_id_681 ad_slot_id_721 ad_slot_id_761
7.7512944 13.7630897 2.3799982 15.9945840 13.7438280
ad_slot_id_801 domain_36 domain_76 domain_116 domain_156
22.5325559 12.1591978 10.4457226 8.7569907 4.2411129
domain_196 domain_236 domain_276 domain_316 domain_356
18.8956320 18.0251400 17.2647840 21.0975200 17.2648830
domain_396 domain_436 domain_476 domain_516 domain_556
13.3977968 18.0251548 16.5933679 22.5326211 8.5747238
domain_596
11.9901496

```

#### \$alpha

```
[1] 0.0005841517
```

#### \$beta

```
[1] 0.0002771071
```