CSE 258 - HW 1

Jin Dai / A92408103

Classification (week 2)

263
```
from urllib.request import urlopen
```

264
```
def parse_data_from_url(fname):
  for l in urlopen(fname):
    yield eval(l)
```

265
```
beer_reviews = list(parse_data_from_url("https://cseweb.ucsd.edu/classes/fa21/cse258-b/data/beer_50000.js
```

266
```
beer_reviews[0]
```

266
```
{'review/appearance': 2.5,
 'beer/style': 'Hefeweizen',
 'review/palate': 1.5,
 'review/taste': 1.5,
 'beer/name': 'Sausa Weizen',
 'review/timeUnix': 1234817823,
 'beer/ABV': 5.0,
 'beer/beerId': '47986',
 'beer/brewerId': '10325',
 'review/timeStruct': {'isdst': 0,
  'mday': 16,
  'hour': 20,
  'min': 57,
  'sec': 3,
  'mon': 2,
  'year': 2009,
  'yday': 47,
  'wday': 0},
 'review/overall': 1.5,
 'review/text': 'A lot of foam. But a lot.\tIn the smell some banana, and then lactic and tart. Not a goo
 'user/profileName': 'stcules',
 'review/aroma': 2.0}
```

Question. 7

267
```
data = [d for d in beer_reviews if 'review/overall' in d and 'review/text' in d]
```

268
```
def featurize(data, featurizer):
    return [featurizer(d) for d in data]


X = featurize(data, lambda d : [1, len(d['review/text'])])
```

269

270

```
X[0:10]
```

270

```
[[1, 262],
 [1, 338],
 [1, 396],
 [1, 401],
 [1, 1145],
 [1, 728],
 [1, 471],
 [1, 853],
 [1, 472],
 [1, 1035]]
```

271

```
def extract_labels(data):
    return [1 if d['review/overall'] >= 4 else 0 for d in data]
```

272

```
y = extract_labels(data)
```

273

```
y[0:10]
```

273

```
[0, 0, 0, 0, 1, 0, 0, 0, 1, 1]
```

274

```
from sklearn import linear_model
```

275

```
mod = linear_model.LogisticRegression(C=1.0, class_weight='balanced')
mod.fit(X,y)
```

275

```
LogisticRegression(class_weight='balanced')
```

276

```
pred = mod.predict(X)
```

277

```
correct = [(a == b) for a, b in zip(y, pred)]
```

278

```
correct[0:10]
```

278

```
[True, True, True, True, True, False, True, False, False, True]
```

279

```
sum(correct) / len(correct)
```

279

```
0.49408
```

280

```
import numpy as np
```

281

```
# True positives, false positives, etc.
TP_ = np.logical_and(pred, y)
FP_ = np.logical_and(pred, np.logical_not(y))
TN_ = np.logical_and(np.logical_not(pred), np.logical_not(y))
FN_ = np.logical_and(np.logical_not(pred), y)

TP = sum(TP_)
```

```
    FP = sum(FP_)
    TN = sum(TN_)
    FN = sum(FN_)

    TPR = TP / (TP + FN)
    TNR = TN / (TN + FP)
    FPR = 1 - TNR
    FNR = 1 - TPR

    # BER
    BER = 1 - 0.5 * (TP / (TP + FN) + TN / (TN + FP))
```

```
282 print("True Positive: %d" % TP)
    print("True Negative: %d" % TN)
    print("False Positive: %d" % FP)
    print("False Negative: %d" % FN)
    print("True Positive Rate: %.4f" % TPR)
    print("True Negative Rate: %.4f" % TNR)
    print("False Positive Rate: %.4f" % FPR)
    print("False Negative Rate: %.4f" % FNR)
    print("Balanced Error Rate: %.6f" % BER)
```

```
    True Positive: 14201
    True Negative: 10503
    False Positive: 5885
    False Negative: 19411
    True Positive Rate: 0.4225
    True Negative Rate: 0.6409
    False Positive Rate: 0.3591
    False Negative Rate: 0.5775
    Balanced Error Rate: 0.468303
```

Question. 8

```
283 # conf = mod.decision_function(X)
```

```
284 # confSorted = list(zip(conf, y))
    # confSorted.sort(key=lambda t: t[0], reverse=True)
```

```
285 # confSorted[:10]
```

```
286 prob = mod.predict_proba(X)
    probSorted = list(zip(prob, y))
```

```
287 probSorted[0][0][1]
```

```
287 0.46054325276076535
```

```
288 probSorted.sort(key=lambda t : t[0][1], reverse=True)
```

```
289 probSorted[:10]
```

```
289 [(array([0.19459931, 0.80540069]), 1),
     (array([0.19643684, 0.80356316]), 1),
 (array([0.20622631, 0.79377369]), 1),
 (array([0.21202257, 0.78797743]), 1),
 (array([0.21655241, 0.78344759]), 1),
 (array([0.22127384, 0.77872616]), 1),
 (array([0.22724752, 0.77275248]), 0),
 (array([0.23156561, 0.76843439]), 1),
 (array([0.23498476, 0.76501524]), 1),
 (array([0.23606837, 0.76393163]), 0)]
```

```
290 probSorted[-10:]
```

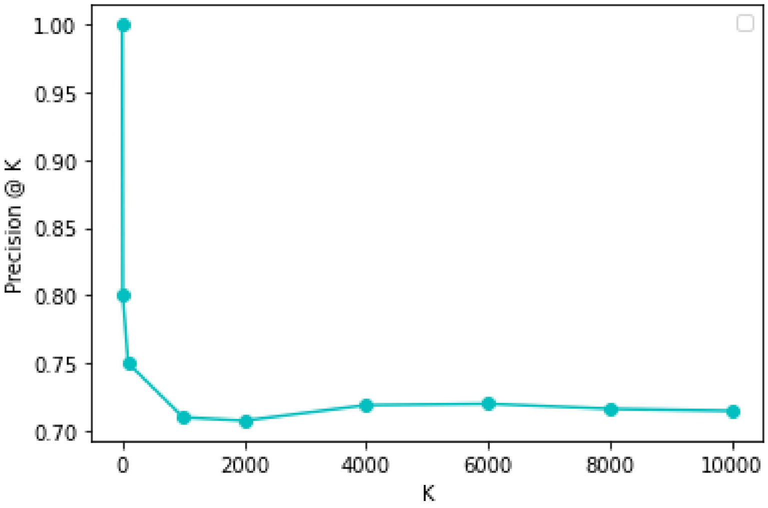
```
290 [(array([0.56239992, 0.43760008]), 1),
     (array([0.56239992, 0.43760008]), 1),
     (array([0.56239992, 0.43760008]), 0),
     (array([0.56239992, 0.43760008]), 1),
     (array([0.56239992, 0.43760008]), 1),
     (array([0.56239992, 0.43760008]), 1),
     (array([0.56239992, 0.43760008]), 1),
     (array([0.56239992, 0.43760008]), 1),
     (array([0.56239992, 0.43760008]), 0),
     (array([0.56239992, 0.43760008]), 0)]
```

```
291 import matplotlib.pyplot as plt
```

```
292 # plot a graph
    K = np.array([1, 10, 100, 1000, 2000, 4000, 6000, 8000, 10000])
```

```
293 p_at_k = np.array([sum(map(lambda x : x[1], probSorted[:k])) / k for k in K])
    plt.plot(K, p_at_k, 'co-')
    plt.xlabel('K')
    plt.ylabel('Precision @ K')
    plt.legend()
    plt.show()
```

```
No handles with labels found to put in legend.
```



Question. 9

```
294 pred_y = [1 if p[1] > p[0] else 0 for p in prob]
    probSorted2 = list(zip(prob, y, pred_y))
```

295
```
probSorted2[:10]
```

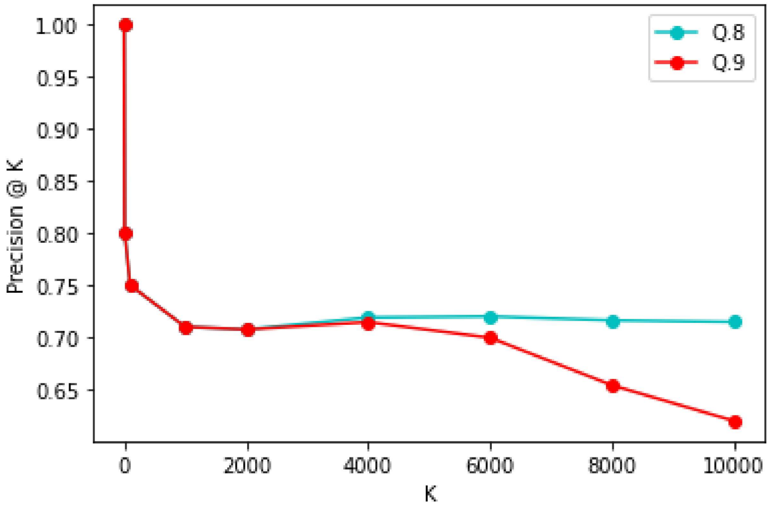
295
```
[(array([0.53945675, 0.46054325]), 0, 0),
 (array([0.53276565, 0.46723435]), 0, 0),
 (array([0.52765121, 0.47234879]), 0, 0),
 (array([0.52721003, 0.47278997]), 0, 0),
 (array([0.46146669, 0.53853331]), 1, 1),
 (array([0.49829621, 0.50170379]), 0, 1),
 (array([0.52102926, 0.47897074]), 0, 0),
 (array([0.48723601, 0.51276399]), 0, 1),
 (array([0.52094091, 0.47905909]), 1, 0),
 (array([0.4711576, 0.5288424]), 1, 1)]
```

296
```
probSorted2.sort(key=lambda t : abs(t[0][1] - 0.5), reverse=True)
```

297
```
probSorted2[:10]
```

297
```
[(array([0.19459931, 0.80540069]), 1, 1),
 (array([0.19643684, 0.80356316]), 1, 1),
 (array([0.20622631, 0.79377369]), 1, 1),
 (array([0.21202257, 0.78797743]), 1, 1),
 (array([0.21655241, 0.78344759]), 1, 1),
 (array([0.22127384, 0.77872616]), 1, 1),
 (array([0.22724752, 0.77275248]), 0, 1),
 (array([0.23156561, 0.76843439]), 1, 1),
 (array([0.23498476, 0.76501524]), 1, 1),
 (array([0.23606837, 0.76393163]), 0, 1)]
```

298
```
p2_at_k = np.array([sum(map(lambda x : 1 if x[1] == x[2] else 0, probSorted2[:k])) / k for k in K])
plt.plot(K, p_at_k, 'co-', label='Q.8')
plt.plot(K, p2_at_k, 'ro-', label='Q.9')
plt.xlabel('K')
plt.ylabel('Precision @ K')
plt.legend()
plt.show()
```



299
```
p2_at_1 = sum(map(lambda x : 1 if x[1] == x[2] else 0, probSorted2[:1])) / 1
p2_at_100 = sum(map(lambda x : 1 if x[1] == x[2] else 0, probSorted2[:100])) / 100
p2_at_10000 = sum(map(lambda x : 1 if x[1] == x[2] else 0, probSorted2[:10000])) / 10000
```

300
```
print("precision@1 = %.4f" % p2_at_1)
print("precision@100 = %.4f" % p2_at_100)
print("precision@10000 = %.4f" % p2_at_10000)
```

```
precision@1 = 1.0000
precision@100 = 0.7500
precision@10000 = 0.6196
```