rs-simple

July 31, 2018

0.1 Evaluation of recommender system algorithms in tourism

0.2 ## Calculation of iterations in cross-validation

```
In [1]: # For better precision on tests
        import random
        import numpy as np

        # For plots some results
        import matplotlib.pyplot as plt
        ## print(plt.style.available)
        plt.style.use('tableau-colorblind10') #seaborn-talk, fivethirtyeight
        %matplotlib inline

        from surprise import Reader, Dataset, KNNBasic, KNNWithMeans, SVD, SVDpp, CoClustering
        from surprise.model_selection import cross_validate
```

```
In [2]: random.seed(0)
        np.random.seed(0)

        reader = Reader(line_format='user item rating', sep=',', rating_scale=(0,5))
        data = Dataset.load_from_file('tourism.csv', reader=reader)
```

kNN Basic with Cosine Similarity

```
In [ ]: sim_options = {'name': 'cosine',
                       'user_based': True}

        algorithm = KNNBasic(k=40, min_k=3, sim_options=sim_options)

        kNNBasicCosine = cross_validate(algorithm, data, measures=['RMSE'], cv=5)
        print(kNNBasicCosine)
```

kNN Basic with Pearson Similarity

```
In [ ]: sim_options = {'name': 'pearson',
                       'user_based': True}
```

```
        algorithm = KNNBasic(k=40, min_k=3, sim_options=sim_options)

        kNNBasicPearson = cross_validate(algorithm, data, measures=['RMSE'], cv=5)
```

kNN Means with Cosine Similarity

```
In [ ]: sim_options = {'name': 'cosine','user_based': True}

        algorithm = KNNWithMeans(k=40, min_k=3, sim_options=sim_options)

        kNNMeansCosine = cross_validate(algorithm, data, measures=['RMSE'], cv=5)
```

kNN Means with Pearson Similarity

```
In [ ]: sim_options = {'name': 'pearson',
                       'user_based': True}

        algorithm = KNNWithMeans(k=40, min_k=3, sim_options=sim_options)

        kNNMeansPearson = cross_validate(algorithm, data, measures=['RMSE'], cv=5)
```

SVD

```
In [7]: algorithm = SVD(n_factors=20, n_epochs=20, lr_all=0.005, reg_all=0.02)

        svd = cross_validate(algorithm, data, measures=['RMSE'], cv=5)
```

SVDpp

```
In [8]: algorithm = SVDpp(n_factors=20, n_epochs=20, lr_all=0.005, reg_all=0.02)

        svdpp = cross_validate(algorithm, data, measures=['RMSE'], cv=5)
```

Co-Clustering

```
In [9]: algorithm = CoClustering(n_cltr_u=3, n_cltr_i=3, n_epochs=20)

        coclustering = cross_validate(algorithm, data, measures=['RMSE'], cv=5)
```

SlopeOne

```
In [10]: algorithm = SlopeOne()

         slopeone = cross_validate(algorithm, data, measures=['RMSE'], cv=5)
```

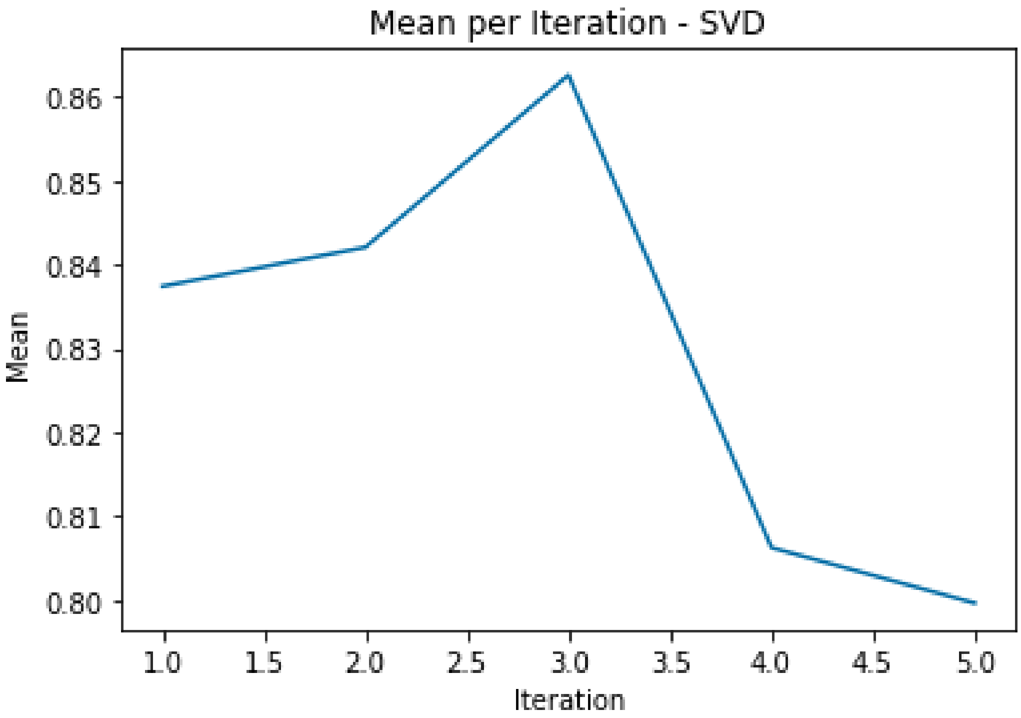
0.3 ## Example of k-Fold Cross-Validate

With Algorithm SVD

```
In [23]: k_folds = range(1, 6)
         svd_k_folds = svd['test_rmse']

         plt.plot(k_folds, svd_k_folds)
         plt.xlabel('Iteration')
         plt.ylabel('Mean')
         plt.title('Mean per Iteration - SVD')
```

```
Out[23]: Text(0.5,1,'Mean per Iteration - SVD')
```

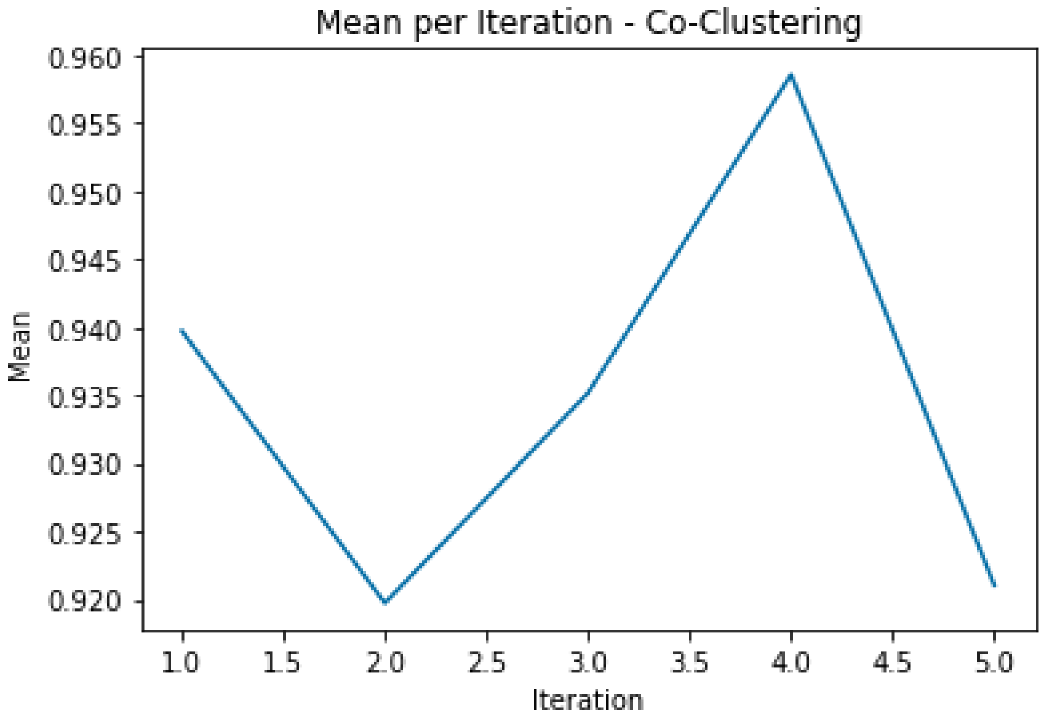


With Co-Clustering Algorithm

```
In [24]: k_folds = range(1, 6)
         coclustering_k_folds = coclustering['test_rmse']

         plt.plot(k_folds, coclustering_k_folds)
         plt.xlabel('Iteration')
         plt.ylabel('Mean')
         plt.title('Mean per Iteration - Co-Clustering')
```

```
Out[24]: Text(0.5,1,'Mean per Iteration - Co-Clustering')
```



0.4 ## Calculate final means of algorithms

```
In [13]: score_kNNBasicCosine = 0
         for mean in kNNBasicCosine['test_rmse']:
             score_kNNBasicCosine = score_kNNBasicCosine + mean

         score_kNNBasicCosine = score_kNNBasicCosine / len(kNNBasicCosine['test_rmse'])

In [14]: score_kNNBasicPearson = 0
         for mean in kNNBasicPearson['test_rmse']:
             score_kNNBasicPearson = score_kNNBasicPearson + mean

         score_kNNBasicPearson = score_kNNBasicPearson / len(kNNBasicPearson['test_rmse'])

In [15]: score_kNNMeansCosine = 0
         for mean in kNNMeansCosine['test_rmse']:
             score_kNNMeansCosine = score_kNNMeansCosine + mean

         score_kNNMeansCosine = score_kNNMeansCosine / len(kNNMeansCosine['test_rmse'])

In [16]: score_kNNMeansPearson = 0
         for mean in kNNMeansPearson['test_rmse']:
             score_kNNMeansPearson = score_kNNMeansPearson + mean

         score_kNNMeansPearson = score_kNNMeansPearson / len(kNNBasicPearson['test_rmse'])
```

```
In [17]: score_SVD = 0
         for mean in svd['test_rmse']:
             score_SVD = score_SVD + mean

         score_SVD = score_SVD / len(svd['test_rmse'])
```

```
In [18]: score_SVDpp = 0
         for mean in svdpp['test_rmse']:
             score_SVDpp = score_SVDpp + mean

         score_SVDpp = score_SVDpp / len(svdpp['test_rmse'])
```

```
In [19]: score_CoClustering = 0
         for mean in coclustering['test_rmse']:
             score_CoClustering = score_CoClustering + mean

         score_CoClustering = score_CoClustering / len(coclustering['test_rmse'])
```

```
In [20]: score_SlopeOne = 0
         for mean in slopeone['test_rmse']:
             score_SlopeOne = score_SlopeOne + mean

         score_SlopeOne = score_SlopeOne / len(slopeone['test_rmse'])
```

0.5 ## Ploting the results

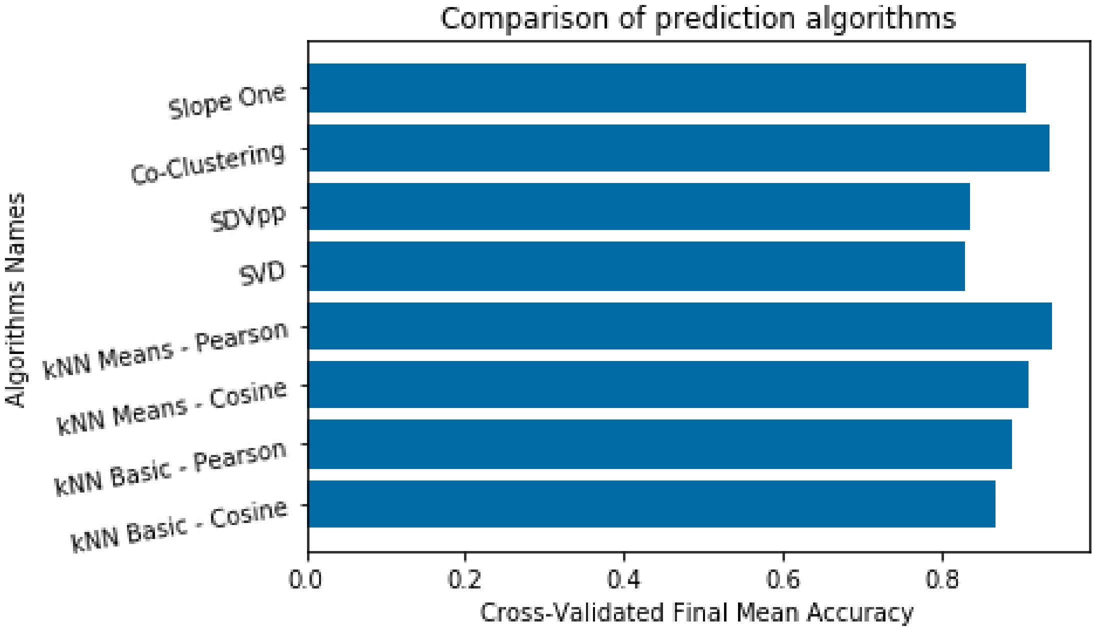
```
In [25]: scores = [score_kNNBasicCosine, score_kNNBasicPearson, score_kNNMeansCosine,
                   score_kNNMeansPearson, score_SVD, score_SVDpp,
                   score_CoClustering, score_SlopeOne]

         algorithms = ['kNN Basic - Cosine', 'kNN Basic - Pearson', 'kNN Means - Cosine', 'kNN
                       'SVD', 'SDVpp', 'Co-Clustering', 'Slope One']

         algorithms_index = np.arange(len(algorithms))
```

```
In [26]: # plot the algorithms (x-axis) versus the cross-validated accuracy (y-axis)
         plt.barh(algorithms_index, scores)
         plt.ylabel('Algorithms Names')
         plt.xlabel('Cross-Validated Final Mean Accuracy')
         plt.yticks(algorithms_index, algorithms, rotation=10)
         plt.title('Comparison of prediction algorithms')
```

```
Out[26]: Text(0.5,1,'Comparison of prediction algorithms')
```


Comparison of prediction algorithms
Algorithms Names
Slope One
Co-Clustering
SDVpp
SVD
kNN Means - Pearson
kNN Means - Cosine
kNN Basic - Pearson
kNN Basic - Cosine
0.0
0.2
0.4
0.6
0.8
Cross-Validated Final Mean Accuracy