

V.6. SmallK Test Results

After building the SmallK library, the 'make check' command will run a bash script that performs a series of tests on the code. Below is a sample output of those tests:

```
Build configuration: release
sh tests/scripts/test_smallk.sh ../xdata_github/smallk_data/ | tee smallk_test_results.txt
*****
*
*           Testing the smallk interface.
*
*
*****
WARNING: Could not achieve THREAD_MULTIPLE support.
Smallk major version: 1
Smallk minor version: 6
Smallk patch level: 0
Smallk version string: 1.6.0
Loading matrix...

Running NMF-BPP...

Initializing matrix W...
Initializing matrix H...

        parameters:

        algorithm: Nonnegative Least Squares with Block Principal Pivoting
        stopping criterion: Ratio of Projected Gradients
        height: 12411
        width: 7984
        k: 8
        miniter: 1
        maxiter: 5000
        tol: 0.005
        matrixfile: ../xdata_github/smallk_data/reuters.mtx
        maxthreads: 8

1:   progress metric:   (min_iter)
2:   progress metric:   0.35826
3:   progress metric:   0.172127
4:   progress metric:   0.106297
5:   progress metric:   0.0696424
6:   progress metric:   0.0538889
7:   progress metric:   0.0559478
8:   progress metric:   0.0686117
9:   progress metric:   0.0788641
10:  progress metric:   0.0711522
20:  progress metric:   0.00568349

Solution converged after 22 iterations.

Elapsed wall clock time: 0.633 sec.

Writing output files...

Running HierNmf2...

Loading dictionary...

        parameters:

        height: 12411
        width: 7984
        matrixfile: ../xdata_github/smallk_data/reuters.mtx
        dictfile: ../xdata_github/smallk_data/reuters_dictionary.txt
        tol: 0.0001
        miniter: 1
        maxiter: 5000
        maxterms: 5
        maxthreads: 8

[1] [2] [3] [4]

Elapsed wall clock time: 551 ms.
9/9 factorizations converged.

Writing output files...
W matrix test passed
H matrix test passed
*****
*
*           Testing the preprocessor.
*
*
*****

Command line options:
```

```

        indir: ../xdata_github/smallk_data/
        outdir: current directory
docs_per_term: 3
terms_per_doc: 5
    max_iter: 1000
    precision: 4
    boolean_mode: 0

Loading input matrix ../xdata_github/smallk_data/matrix.mtx
Input file load time: 1.421s.

Starting iterations...
[1] height: 39771, width: 11237, nonzeros: 877453
Iterations finished.
    New height: 39727
    New width: 11237
    New nonzero count: 877374
Processing time: 0.063s.

Writing output matrix 'reduced_matrix.mtx'
Output file write time: 2.189s.
Writing dictionary file 'reduced_dictionary.txt'
Writing documents file 'reduced_documents.txt'
Dictionary + documents write time: 0.083s.
preprocessor matrix test passed
preprocessor dictionary test passed
preprocessor documents test passed
*****
*
*           Testing the NMF routines.           *
*
*****
WARNING: Could not achieve THREAD_MULTIPLE support.
Loading matrix...
Initializing matrix W...
Initializing matrix H...

Command line options:

    algorithm: Nonnegative Least Squares with Block Principal Pivoting
    stopping criterion: Ratio of Projected Gradients
        height: 12411
        width: 7984
        k: 8
    miniter: 1
    maxiter: 5000
    tol: 0.005
    tolcount: 1
    verbose: 1
    normalize: 1
    outprecision: 6
    matrixfile: ../xdata_github/smallk_data//reuters.mtx
    infile_W: ../xdata_github/smallk_data//nmf_init_w.csv
    infile_H: ../xdata_github/smallk_data//nmf_init_h.csv
    outfile_W: w.csv
    outfile_H: h.csv
    maxthreads: 8

1:   progress metric:   (min_iter)
2:   progress metric:   0.35826
3:   progress metric:   0.172127
4:   progress metric:   0.106297
5:   progress metric:   0.0696424
6:   progress metric:   0.0538889
7:   progress metric:   0.0559478
8:   progress metric:   0.0686117
9:   progress metric:   0.0788641
10:  progress metric:   0.0711522
20:  progress metric:   0.00568349

Solution converged after 22 iterations.

Elapsed wall clock time: 0.673 sec.

Writing output files...
NMF W matrix test passed
NMF H matrix test passed
*****
*
*           Testing hierclust.           *
*
*****
-----

    Reuters matrix, 12 clusters

-----
WARNING: Could not achieve THREAD_MULTIPLE support.
loading dictionary...

```

```

loading matrix...

Command line options:

    height: 12411
    width: 7984
    matrixfile: ../xdata_github/smallk_data//reuters.mtx
    initdir: ../xdata_github/smallk_data//test/matrices.reuters/
    dictfile: ../xdata_github/smallk_data//reuters_dictionary.txt
    assignfile: assignments_12.csv
    format: XML
    treefile: tree_12.xml
    clusters: 12
        tol: 0.0001
    outdir:
    miniter: 1
    maxiter: 5000
    maxterms: 5
    maxthreads: 8
    unbalanced: 0.1
    trial_allowance: 3
        flat: 0
    verbose: 1

[1] [2] [3] [4] [5] [6] dropping 20 items ...
[7] [8] [9] [10] [11]

Elapsed wall clock time: 2.758 s.
26/26 factorizations converged.

Writing output files...
XML file test passed
assignment file test passed
-----

    20News matrix, 15 clusters

-----
WARNING: Could not achieve THREAD_MULTIPLE support.
loading dictionary...
loading matrix...

Command line options:

    height: 39727
    width: 11237
    matrixfile: ../xdata_github/smallk_data//news20.mtx
    initdir: ../xdata_github/smallk_data//test/matrices.20news/
    dictfile: ../xdata_github/smallk_data//news20_dictionary.txt
    assignfile: assignments_15.csv
    format: XML
    treefile: tree_15.xml
    clusters: 15
        tol: 0.0001
    outdir:
    miniter: 1
    maxiter: 5000
    maxterms: 5
    maxthreads: 8
    unbalanced: 0.1
    trial_allowance: 3
        flat: 0
    verbose: 1

[1] [2] [3] dropping 30 items ...
[4] [5] dropping 132 items ...
[6] [7] [8] [9] [10] dropping 41 items ...
[11] dropping 51 items ...
[12] dropping 22 items ...
[13] dropping 85 items ...
[14]

Elapsed wall clock time: 10.308 s.
41/41 factorizations converged.

Writing output files...
XML file test passed
assignment file test passed
*****
*                                     *
*           Testing flatclust.         *
*                                     *
*****
WARNING: Could not achieve THREAD_MULTIPLE support.
loading dictionary...
loading matrix...
Initializing matrix W...
Initializing matrix H...

```

Command line options:

```
height: 256
width: 256
matrixfile: ../xdata_github/smallk_data//rnd_256_256.csv
infile_W: ../xdata_github/smallk_data//flatclust_init_w.csv
infile_H: ../xdata_github/smallk_data//flatclust_init_h.csv
dictfile: ../xdata_github/smallk_data//reuters_dictionary.txt
assignfile: assignments_16.csv
fuzzyfile: assignments_fuzzy_16.csv
format: XML
clustfile: clusters_16.xml
algorithm: HALS
clusters: 16
tol: 0.0001
outdir:
miniter: 1
maxiter: 5000
maxterms: 5
maxthreads: 8
verbose: 1
```

```
1: progress metric: (min_iter)
2: progress metric: 0.635556
3: progress metric: 0.490817
4: progress metric: 0.479135
5: progress metric: 0.474986
6: progress metric: 0.44968
7: progress metric: 0.422542
8: progress metric: 0.407662
9: progress metric: 0.395145
10: progress metric: 0.379238
20: progress metric: 0.272868
30: progress metric: 0.168386
40: progress metric: 0.109147
50: progress metric: 0.0767327
60: progress metric: 0.0488545
70: progress metric: 0.036226
80: progress metric: 0.0307648
90: progress metric: 0.0266116
100: progress metric: 0.0226963
110: progress metric: 0.0188616
120: progress metric: 0.0158307
130: progress metric: 0.0137605
140: progress metric: 0.0127888
150: progress metric: 0.0123962
160: progress metric: 0.0124734
170: progress metric: 0.0123563
180: progress metric: 0.0122163
190: progress metric: 0.0120643
200: progress metric: 0.0117647
210: progress metric: 0.0114894
220: progress metric: 0.0110467
230: progress metric: 0.0107816
240: progress metric: 0.0105239
250: progress metric: 0.0103824
260: progress metric: 0.0100915
270: progress metric: 0.00965073
280: progress metric: 0.00938526
290: progress metric: 0.00914129
300: progress metric: 0.00896701
310: progress metric: 0.00886729
320: progress metric: 0.00841059
330: progress metric: 0.007793
340: progress metric: 0.00740095
350: progress metric: 0.00708869
360: progress metric: 0.00683069
370: progress metric: 0.00672093
380: progress metric: 0.00687906
390: progress metric: 0.00703777
400: progress metric: 0.00721928
410: progress metric: 0.00729384
420: progress metric: 0.00718332
430: progress metric: 0.00722893
440: progress metric: 0.00726766
450: progress metric: 0.00739665
460: progress metric: 0.00769819
470: progress metric: 0.00814673
480: progress metric: 0.008566
490: progress metric: 0.00877955
500: progress metric: 0.00884221
510: progress metric: 0.0088057
520: progress metric: 0.00852345
530: progress metric: 0.00797952
540: progress metric: 0.00749354
550: progress metric: 0.00689316
560: progress metric: 0.00623287
570: progress metric: 0.00576619
580: progress metric: 0.00541125
```

590: progress metric: 0.00501715
600: progress metric: 0.00466547
610: progress metric: 0.00432811
620: progress metric: 0.00412669
630: progress metric: 0.00383406
640: progress metric: 0.00352802
650: progress metric: 0.00331556
660: progress metric: 0.00315735
670: progress metric: 0.00304253
680: progress metric: 0.00296627
690: progress metric: 0.00289013
700: progress metric: 0.00279647
710: progress metric: 0.00271036
720: progress metric: 0.00261087
730: progress metric: 0.0025158
740: progress metric: 0.00245123
750: progress metric: 0.00237435
760: progress metric: 0.00231126
770: progress metric: 0.00228199
780: progress metric: 0.00227623
790: progress metric: 0.00228185
800: progress metric: 0.00227993
810: progress metric: 0.00228216
820: progress metric: 0.00228018
830: progress metric: 0.00229096
840: progress metric: 0.00232403
850: progress metric: 0.00234957
860: progress metric: 0.00227868
870: progress metric: 0.00210786
880: progress metric: 0.00195462
890: progress metric: 0.00183587
900: progress metric: 0.00173358
910: progress metric: 0.0016405
920: progress metric: 0.00156422
930: progress metric: 0.00150835
940: progress metric: 0.00146594
950: progress metric: 0.00143261
960: progress metric: 0.00137378
970: progress metric: 0.00131989
980: progress metric: 0.00126626
990: progress metric: 0.0012164
1000: progress metric: 0.00117061
1010: progress metric: 0.00112539
1020: progress metric: 0.00108626
1030: progress metric: 0.00105192
1040: progress metric: 0.00102131
1050: progress metric: 0.000992069
1060: progress metric: 0.000965259
1070: progress metric: 0.000938949
1080: progress metric: 0.000911962
1090: progress metric: 0.000884505
1100: progress metric: 0.000854904
1110: progress metric: 0.000820121
1120: progress metric: 0.000785245
1130: progress metric: 0.000752513
1140: progress metric: 0.000723279
1150: progress metric: 0.000697698
1160: progress metric: 0.000680904
1170: progress metric: 0.000652152
1180: progress metric: 0.000628268
1190: progress metric: 0.000612413
1200: progress metric: 0.000596834
1210: progress metric: 0.000580674
1220: progress metric: 0.000556549
1230: progress metric: 0.000535666
1240: progress metric: 0.00051492
1250: progress metric: 0.000496234
1260: progress metric: 0.000481147
1270: progress metric: 0.000461294
1280: progress metric: 0.000440802
1290: progress metric: 0.000419049
1300: progress metric: 0.000398007
1310: progress metric: 0.000376203
1320: progress metric: 0.000355811
1330: progress metric: 0.00033729
1340: progress metric: 0.000318932
1350: progress metric: 0.000302528
1360: progress metric: 0.000287961
1370: progress metric: 0.00027486
1380: progress metric: 0.00026403
1390: progress metric: 0.000255504
1400: progress metric: 0.000248646
1410: progress metric: 0.000242996
1420: progress metric: 0.000239243
1430: progress metric: 0.000236852
1440: progress metric: 0.000235313
1450: progress metric: 0.000234465
1460: progress metric: 0.000234154
1470: progress metric: 0.000234253

1480: progress metric: 0.00023487
1490: progress metric: 0.000237223
1500: progress metric: 0.000240043
1510: progress metric: 0.000243896
1520: progress metric: 0.00024867
1530: progress metric: 0.000253981
1540: progress metric: 0.000260239
1550: progress metric: 0.000266795
1560: progress metric: 0.000273529
1570: progress metric: 0.000280678
1580: progress metric: 0.000287273
1590: progress metric: 0.000292288
1600: progress metric: 0.000296475
1610: progress metric: 0.000299556
1620: progress metric: 0.00030244
1630: progress metric: 0.000306148
1640: progress metric: 0.000310299
1650: progress metric: 0.000314674
1660: progress metric: 0.000319052
1670: progress metric: 0.000323906
1680: progress metric: 0.000329536
1690: progress metric: 0.000335913
1700: progress metric: 0.000342834
1710: progress metric: 0.000351167
1720: progress metric: 0.000352515
1730: progress metric: 0.000348749
1740: progress metric: 0.000345684
1750: progress metric: 0.000343139
1760: progress metric: 0.000340867
1770: progress metric: 0.000339052
1780: progress metric: 0.000337038
1790: progress metric: 0.000335244
1800: progress metric: 0.000333452
1810: progress metric: 0.000332111
1820: progress metric: 0.000330198
1830: progress metric: 0.000325983
1840: progress metric: 0.000321473
1850: progress metric: 0.000316999
1860: progress metric: 0.000312054
1870: progress metric: 0.000305176
1880: progress metric: 0.000294684
1890: progress metric: 0.000284482
1900: progress metric: 0.000274905
1910: progress metric: 0.000265684
1920: progress metric: 0.000256761
1930: progress metric: 0.000248203
1940: progress metric: 0.000239613
1950: progress metric: 0.000230677
1960: progress metric: 0.00022218
1970: progress metric: 0.000214089
1980: progress metric: 0.00020621
1990: progress metric: 0.000196915
2000: progress metric: 0.000187712
2010: progress metric: 0.000179199
2020: progress metric: 0.00017137
2030: progress metric: 0.000164158
2040: progress metric: 0.000157751
2050: progress metric: 0.000152485
2060: progress metric: 0.000147217
2070: progress metric: 0.000142083
2080: progress metric: 0.000137148
2090: progress metric: 0.000132379
2100: progress metric: 0.000127922
2110: progress metric: 0.000123617
2120: progress metric: 0.000119548
2130: progress metric: 0.000115684
2140: progress metric: 0.000111997
2150: progress metric: 0.000108389
2160: progress metric: 0.000104838
2170: progress metric: 0.000101387

Solution converged after 2175 iterations.

Elapsed wall clock time: 1.022 sec.

XML file test passed
assignment file test passed
fuzzy assignment file test passed
***** SmallK: All tests passed. *****