Table of Contents

addpath for PQN working 1
sample matrix and options 1
reconstruct 1

addpath for PQN working

```
%addpath(genpath('/Volumes/Users/linamiao/Dropbox/PQN/'))
cd ../../../../pqnl1;
addpath(genpath(pwd))
cd ../experiments/help_spgl1/modifying/task13twoLayerInexact
addpath(genpath(pwd))
rmpath('/Volumes/Users/linamiao/Dropbox/PQN/pqnl1/minConF/')

%stream = RandStream.getGlobalStream;
%reset(stream);
```

```
Warning: "\Volumes\Users\linamiao\Dropbox\PQN\pqnl1\minConF"
not found in path.
```

sample matrix and options

m = 120; n = 512; k = 20; % m rows, n cols, k nonzeros. A = randn(m,n); [Q,R] = qr(A',0); A = Q';

opts.decTol = 1e-3; opts.optTol = 1e-4; opts.iterations = 100;

p = randperm(n); x0 = zeros(n,1); x0(p(1:k)) = sign(randn(k,1)); figure;plot(x0) b = A*x0;

tau = norm(x0,1);

save temp A m n k b tau x0 opts

```
clear;close all;
load temp
```

reconstruct

```
%[x_spg1,r_spg1,g_spg1,info_spg1] = spgl1(A, b, tau, [], zeros(size(x0)), opts);
flag = 1;
[x_pqn1,r_pqn1,g_pqn1,info_pqn1] = pqnl1_2(A, b, tau, [], zeros(size(x0)), opts,fl
flag = 0;
[x_pqn2,r_pqn2,g_pqn2,info_pqn2] = pqnl1_2(A, b, tau, [], zeros(size(x0)), opts,fl


info_pqn1
info_pqn2


figure;
subplot(3,1,1);plot(x0);title('x0')
```

```
subplot(3,1,2);plot(x_pqn1);title('two layer')
subplot(3,1,3);plot(x_pqn2);title('optTol')
```

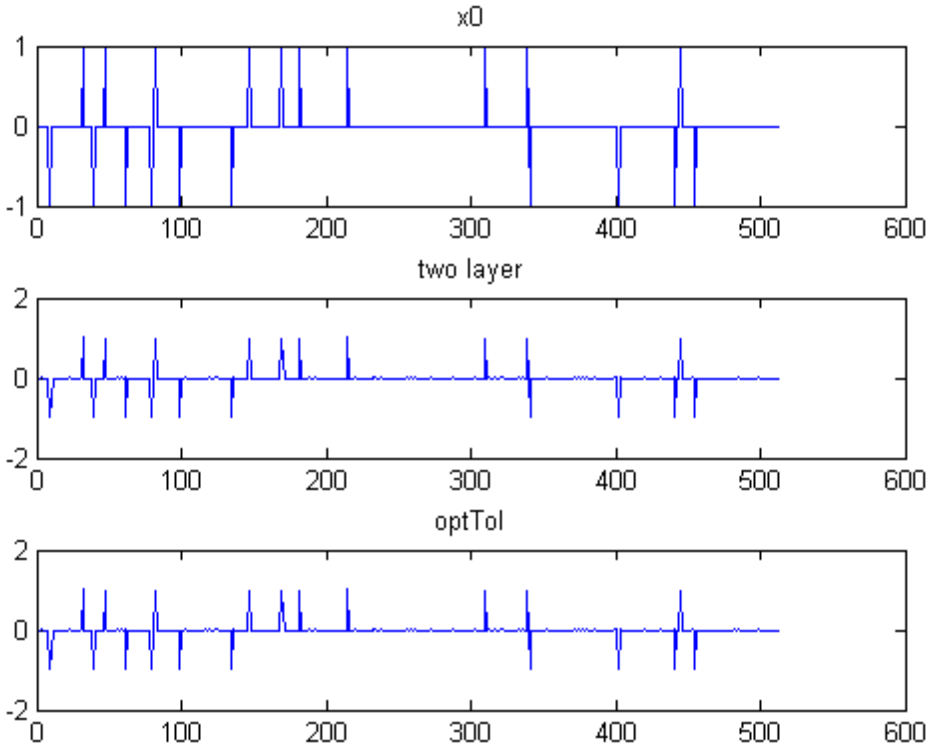
```
 ================================================================================
 PQNL1_SLIM v. 46  (Tue, 14 Jun 2011) based on v.1017
 ================================================================================
 No. rows              :      120      No. columns           :      512
 Initial tau           : 2.00e+001      Two-norm of b         : 2.03e+000
 Optimality tol        : 1.00e-004      Target one-norm of x  : 2.00e+001
 Basis pursuit tol     : 1.00e-006      Maximum iterations    :      100

  Iter      Objective   Relative Gap      gNorm   stepG    nnzX    nnzG
     0  2.0320764e+000  3.0574810e+000  3.16e-001     0.0       0       0
Inside of minConf_PQN
 Iteration   FunEvals Projections     Step Length          rNorm2         Opt Cond
         1          1           4    1.00000e+000    6.50723e-001    3.34410e+000
break of testUpdate
         2          1          15    1.00000e+000    5.40414e-001    2.05095e+000
break of testUpdate
         3          1          30    1.00000e+000    4.29040e-001    1.16536e+000
break of testUpdate
         4          1          45    1.00000e+000    3.68211e-001    8.80412e-001
break of testUpdate
         5          1          64    1.00000e+000    3.26984e-001    6.97037e-001
break of testUpdate
         6          1          91    1.00000e+000    2.94399e-001    5.76302e-001
break of testUpdate
         7          1         118    1.00000e+000    2.70200e-001    4.92909e-001
break of testUpdate
         8          1         145    1.00000e+000    2.47845e-001    4.30323e-001
break of testUpdate
         9          1         172    1.00000e+000    2.29582e-001    3.73156e-001
break of testUpdate
        10          1         201    1.00000e+000    2.15165e-001    3.11568e-001
break of testUpdate
        11          1         232    1.00000e+000    2.00816e-001    3.06458e-001
break of testUpdate
        12          1         262    1.00000e+000    1.89090e-001    3.14562e-001
break of testUpdate
        13          1         302    1.00000e+000    1.74184e-001    2.99605e-001
break of testUpdate
        14          1         333    1.00000e+000    1.64347e-001    2.40206e-001
break of testUpdate
        15          1         363    1.00000e+000    1.52642e-001    2.29772e-001
break of testUpdate
        16          1         395    1.00000e+000    1.47658e-001    1.99748e-001
break of testUpdate
        17          1         433    1.00000e+000    1.38474e-001    1.61906e-001
break of testUpdate
        18          1         463    1.00000e+000    1.31798e-001    1.88052e-001
break of testUpdate
        19          1         514    1.00000e+000    1.24576e-001    1.99253e-001
break of testUpdate
        20          1         564    1.00000e+000    1.15506e-001    1.77585e-001
break of testUpdate
        21          1         605    1.00000e+000    1.07668e-001    1.45541e-001
break of testUpdate
        22          1         645    1.00000e+000    9.97196e-002    1.51134e-001
break of testUpdate
        23          1         700    1.00000e+000    9.00503e-002    1.74071e-001
        24          1         742    1.00000e+000    8.22821e-002    1.59835e-001
break of testUpdate
        25          1         795    1.00000e+000    6.54837e-002    1.52196e-001
```

```
        26          1         827    1.00000e+000    5.81685e-002    1.27245e-001
break of testUpdate
        27          1         868    1.00000e+000    4.65618e-002    9.09061e-002
        28          1         899    1.00000e+000    4.24021e-002    7.46236e-002
        29          1         927    1.00000e+000    3.75865e-002    6.32613e-002
        30          1         958    1.00000e+000    3.33399e-002    5.42800e-002
        31          1         986    1.00000e+000    2.86651e-002    5.59525e-002
        32          1        1013    1.00000e+000    2.58142e-002    3.98877e-002
        33          1        1036    1.00000e+000    2.18583e-002    3.36558e-002
        34          1        1053    1.00000e+000    2.03865e-002    2.62162e-002
        35          1        1082    1.00000e+000    1.79632e-002    2.38414e-002
        36          1        1106    1.00000e+000    1.68318e-002    2.50432e-002
        37          1        1124    1.00000e+000    1.58824e-002    2.20294e-002
        38          1        1136    1.00000e+000    1.49524e-002    2.00426e-002
        39          1        1147    1.00000e+000    1.45075e-002    2.90178e-002
        40          1        1154    1.00000e+000    1.40045e-002    1.76605e-002
        41          1        1170    1.00000e+000    1.30387e-002    1.15708e-002
        42          1        1186    1.00000e+000    1.21614e-002    1.20550e-002
        43          1        1198    1.00000e+000    1.15835e-002    1.90613e-002
        44          1        1205    1.00000e+000    1.12720e-002    1.15057e-002
        45          1        1217    1.00000e+000    1.03752e-002    1.01562e-002
        46          1        1222    1.00000e+000    1.02647e-002    7.45574e-003
        47          1        1227    1.00000e+000    1.01898e-002    6.63169e-003
        48          1        1232    1.00000e+000    1.01231e-002    6.35139e-003
        49          1        1237    1.00000e+000    1.00596e-002    6.14638e-003
        50          1        1242    1.00000e+000    9.99812e-003    5.96183e-003
        51          1        1247    1.00000e+000    9.93825e-003    5.83826e-003
        52          1        1252    1.00000e+000    9.87957e-003    5.74259e-003
        53          1        1257    1.00000e+000    9.82188e-003    5.61528e-003
        54          1        1262    1.00000e+000    9.76526e-003    5.51368e-003
        55          1        1267    1.00000e+000    9.70956e-003    5.45208e-003
        56          1        1272    1.00000e+000    9.65458e-003    5.39283e-003
        57          1        1277    1.00000e+000    9.60027e-003    5.33191e-003
        58          1        1282    1.00000e+000    9.54656e-003    5.27601e-003
        59          1        1287    1.00000e+000    9.49341e-003    5.22269e-003
        60          1        1292    1.00000e+000    9.44079e-003    5.17312e-003
        61          1        1297    1.00000e+000    9.38868e-003    5.12338e-003
        62          1        1302    1.00000e+000    9.33706e-003    5.07857e-003
        63          1        1307    1.00000e+000    9.28590e-003    5.03568e-003
        64          1        1312    1.00000e+000    9.23518e-003    4.99313e-003
        65          1        1317    1.00000e+000    9.18490e-003    4.93736e-003
        66          1        1322    1.00000e+000    9.13508e-003    4.89787e-003
        67          1        1327    1.00000e+000    9.08568e-003    4.85863e-003
        68          1        1332    1.00000e+000    9.03668e-003    4.81975e-003
        69          1        1337    1.00000e+000    8.98808e-003    4.76850e-003
        70          1        1342    1.00000e+000    8.93989e-003    4.72689e-003
        71          1        1347    1.00000e+000    8.89210e-003    4.69340e-003
        72          1        1352    1.00000e+000    8.84470e-003    4.65937e-003
        73          1        1357    1.00000e+000    8.79766e-003    4.62523e-003
        74          1        1362    1.00000e+000    8.75097e-003    4.59122e-003
        75          1        1367    1.00000e+000    8.70464e-003    4.55742e-003
        76          1        1372    1.00000e+000    8.65866e-003    4.52391e-003
        77          1        1377    1.00000e+000    8.61301e-003    4.49205e-003
        78          1        1382    1.00000e+000    8.56769e-003    4.45201e-003
        79          1        1387    1.00000e+000    8.52273e-003    4.41871e-003
        80          1        1392    1.00000e+000    8.47812e-003    4.38897e-003
        81          1        1397    1.00000e+000    8.43383e-003    4.35886e-003
        82          1        1402    1.00000e+000    8.38985e-003    4.32944e-003
        83          1        1407    1.00000e+000    8.34619e-003    4.28041e-003
        84          1        1412    1.00000e+000    8.30299e-003    4.23003e-003
        85          1        1417    1.00000e+000    8.26023e-003    4.18818e-003
        86          1        1422    1.00000e+000    8.21783e-003    4.15210e-003
        87          1        1427    1.00000e+000    8.17576e-003    4.11896e-003
        88          1        1432    1.00000e+000    8.13403e-003    4.08880e-003
```

```
        89          1       1437    1.00000e+000    8.09261e-003    4.06088e-003
        90          1       1442    1.00000e+000    8.05150e-003    4.03330e-003
        91          1       1447    1.00000e+000    8.01069e-003    4.00593e-003
        92          1       1452    1.00000e+000    7.97018e-003    3.97878e-003
        93          1       1457    1.00000e+000    7.92995e-003    3.95185e-003
        94          1       1462    1.00000e+000    7.89002e-003    3.92514e-003
        95          1       1467    1.00000e+000    7.85036e-003    3.89904e-003
        96          1       1472    1.00000e+000    7.81097e-003    3.87315e-003
        97          1       1477    1.00000e+000    7.77186e-003    3.84748e-003
        98          1       1482    1.00000e+000    7.73302e-003    3.82202e-003
        99          1       1487    1.00000e+000    7.69443e-003    3.79347e-003
       100          1       1492    1.00000e+000    7.65611e-003    3.76552e-003
  100  7.6561100e-003  2.5919835e-003  7.32e-004     0.0      94       0
ERROR EXIT -- Too many iterations

Products with A     :     102        Total time   (secs) :     3.5
Products with A'    :     102        Project time (secs) :     2.7
Newton iterations   :       0        Mat-vec time (secs) :     0.1


================================================================================
PQNL1_SLIM v. 46  (Tue, 14 Jun 2011) based on v.1017
================================================================================
No. rows              :      120      No. columns           :      512
Initial tau           : 2.00e+001      Two-norm of b         : 2.03e+000
Optimality tol        : 1.00e-004      Target one-norm of x  : 2.00e+001
Basis pursuit tol     : 1.00e-006      Maximum iterations    :      100

  Iter      Objective   Relative Gap      gNorm   stepG    nnzX    nnzG
     0  2.0320764e+000  3.0574810e+000  3.16e-001     0.0       0       0
Inside of minConf_PQN
 Iteration   FunEvals Projections     Step Length          rNorm2        Opt Cond
         1          1           4    1.00000e+000    6.50723e-001    3.34410e+000
         2          1          17    1.00000e+000    5.40414e-001    2.05094e+000
         3          1          36    1.00000e+000    4.28244e-001    1.16383e+000
         4          1          55    1.00000e+000    3.66772e-001    8.81960e-001
         5          1          80    1.00000e+000    3.27172e-001    7.13677e-001
         6          1         107    1.00000e+000    2.94280e-001    5.84513e-001
         7          1         134    1.00000e+000    2.70039e-001    4.94799e-001
         8          1         161    1.00000e+000    2.47822e-001    4.31440e-001
         9          1         190    1.00000e+000    2.29651e-001    3.78460e-001
        10          1         219    1.00000e+000    2.15128e-001    3.14279e-001
        11          1         250    1.00000e+000    2.00939e-001    3.05321e-001
        12          1         280    1.00000e+000    1.89022e-001    3.13203e-001
        13          1         322    1.00000e+000    1.74352e-001    3.01608e-001
        14          1         353    1.00000e+000    1.64473e-001    2.42722e-001
        15          1         385    1.00000e+000    1.52633e-001    2.30263e-001
        16          1         417    1.00000e+000    1.47631e-001    2.00251e-001
        17          1         454    1.00000e+000    1.38618e-001    1.59320e-001
        18          1         484    1.00000e+000    1.31712e-001    1.90586e-001
        19          1         526    1.00000e+000    1.24752e-001    2.02721e-001
        20          1         575    1.00000e+000    1.15640e-001    1.77212e-001
        21          1         605    1.00000e+000    1.07740e-001    1.42503e-001
        22          1         645    1.00000e+000    1.00308e-001    1.46917e-001
        23          1         701    1.00000e+000    9.05802e-002    1.70934e-001
        24          1         744    1.00000e+000    8.31440e-002    1.55635e-001
        25          1         797    1.00000e+000    6.66574e-002    1.44137e-001
        26          1         838    1.00000e+000    5.88719e-002    1.26429e-001
        27          1         880    1.00000e+000    4.69375e-002    9.75145e-002
        28          1         912    1.00000e+000    4.22884e-002    7.93259e-002
        29          1         952    1.00000e+000    3.67831e-002    7.00587e-002
        30          1         996    1.00000e+000    3.13059e-002    6.39284e-002
        31          1        1027    1.00000e+000    2.77025e-002    5.40109e-002
        32          1        1058    1.00000e+000    2.42309e-002    4.02542e-002
```

33	1	1075	1.00000e+000	2.24466e-002	3.13395e-002
34	1	1102	1.00000e+000	2.03375e-002	2.70042e-002
35	1	1128	1.00000e+000	1.89550e-002	2.24323e-002
36	1	1140	1.00000e+000	1.79925e-002	2.51743e-002
37	1	1160	1.00000e+000	1.69424e-002	1.97633e-002
38	1	1186	1.00000e+000	1.49307e-002	1.52828e-002
39	1	1202	1.00000e+000	1.41638e-002	1.38319e-002
40	1	1214	1.00000e+000	1.34294e-002	2.27644e-002
41	1	1221	1.00000e+000	1.30506e-002	1.34509e-002
42	1	1237	1.00000e+000	1.21596e-002	1.06742e-002
43	1	1253	1.00000e+000	1.12936e-002	1.02462e-002
44	1	1258	1.00000e+000	1.11817e-002	8.22528e-003
45	1	1263	1.00000e+000	1.10976e-002	7.51372e-003
46	1	1268	1.00000e+000	1.10220e-002	7.05628e-003
47	1	1273	1.00000e+000	1.09507e-002	6.78565e-003
48	1	1278	1.00000e+000	1.08821e-002	6.61286e-003
49	1	1283	1.00000e+000	1.08154e-002	6.49142e-003
50	1	1288	1.00000e+000	1.07502e-002	6.39103e-003
51	1	1293	1.00000e+000	1.06862e-002	6.30112e-003
52	1	1298	1.00000e+000	1.06232e-002	6.16801e-003
53	1	1303	1.00000e+000	1.05614e-002	6.03958e-003
54	1	1308	1.00000e+000	1.05008e-002	5.96429e-003
55	1	1313	1.00000e+000	1.04410e-002	5.89122e-003
56	1	1318	1.00000e+000	1.03820e-002	5.82369e-003
57	1	1323	1.00000e+000	1.03236e-002	5.75872e-003
58	1	1328	1.00000e+000	1.02659e-002	5.68299e-003
59	1	1333	1.00000e+000	1.02088e-002	5.61689e-003
60	1	1338	1.00000e+000	1.01523e-002	5.56135e-003
61	1	1343	1.00000e+000	1.00964e-002	5.50890e-003
62	1	1348	1.00000e+000	1.00410e-002	5.45901e-003
63	1	1353	1.00000e+000	9.98605e-003	5.41178e-003
64	1	1358	1.00000e+000	9.93161e-003	5.36721e-003
65	1	1363	1.00000e+000	9.87763e-003	5.32351e-003
66	1	1368	1.00000e+000	9.82411e-003	5.28067e-003
67	1	1373	1.00000e+000	9.77102e-003	5.23226e-003
68	1	1378	1.00000e+000	9.71838e-003	5.19005e-003
69	1	1383	1.00000e+000	9.66617e-003	5.15051e-003
70	1	1388	1.00000e+000	9.61438e-003	5.11126e-003
71	1	1393	1.00000e+000	9.56299e-003	5.04102e-003
72	1	1398	1.00000e+000	9.51223e-003	4.98922e-003
73	1	1403	1.00000e+000	9.46192e-003	4.93788e-003
74	1	1408	1.00000e+000	9.41206e-003	4.88306e-003
75	1	1413	1.00000e+000	9.36265e-003	4.83684e-003
76	1	1418	1.00000e+000	9.31367e-003	4.79755e-003
77	1	1423	1.00000e+000	9.26510e-003	4.75913e-003
78	1	1428	1.00000e+000	9.21693e-003	4.72146e-003
79	1	1433	1.00000e+000	9.16913e-003	4.68444e-003
80	1	1438	1.00000e+000	9.12172e-003	4.64868e-003
81	1	1443	1.00000e+000	9.07467e-003	4.61370e-003
82	1	1448	1.00000e+000	9.02797e-003	4.57979e-003
83	1	1453	1.00000e+000	8.98163e-003	4.54657e-003
84	1	1458	1.00000e+000	8.93564e-003	4.51405e-003
85	1	1463	1.00000e+000	8.88998e-003	4.46953e-003
86	1	1468	1.00000e+000	8.84471e-003	4.43707e-003
87	1	1473	1.00000e+000	8.79981e-003	4.40916e-003
88	1	1478	1.00000e+000	8.75524e-003	4.38076e-003
89	1	1483	1.00000e+000	8.71100e-003	4.35171e-003
90	1	1488	1.00000e+000	8.66709e-003	4.31884e-003
91	1	1493	1.00000e+000	8.62350e-003	4.28863e-003
92	1	1498	1.00000e+000	8.58022e-003	4.25942e-003
93	1	1503	1.00000e+000	8.53724e-003	4.23052e-003
94	1	1508	1.00000e+000	8.49457e-003	4.20196e-003
95	1	1513	1.00000e+000	8.45219e-003	4.17405e-003
96	1	1518	1.00000e+000	8.41010e-003	4.14624e-003

```
        97          1       1523    1.00000e+000    8.36829e-003    4.11860e-003
        98          1       1528    1.00000e+000    8.32677e-003    4.09137e-003
        99          1       1533    1.00000e+000    8.28552e-003    4.06196e-003
       100          1       1538    1.00000e+000    8.24455e-003    4.03356e-003
   100  8.2445517e-003  2.8230734e-003  7.90e-004     0.0      97        0
 ERROR EXIT -- Too many iterations

 Products with A     :     102        Total time   (secs) :     3.6
 Products with A'    :     102        Project time (secs) :     2.7
 Newton iterations   :       0        Mat-vec time (secs) :     0.1


info_pqn1 =

           tau: 20
          rNorm: 0.0077
           rGap: 0.0026
          gNorm: 7.3247e-004
           stat: 5
           iter: 100
         nProdA: 102
        nProdAt: 102
        nNewton: 0
    timeProject: 2.6504
    timeMatProd: 0.0562
        itnLSQR: 0
        options: [1x1 struct]
      timeTotal: 3.5042
         xNorm1: [100x1 double]
         rNorm2: [100x1 double]
         lambda: [100x1 double]


info_pqn2 =

           tau: 20
          rNorm: 0.0082
           rGap: 0.0028
          gNorm: 7.8963e-004
           stat: 5
           iter: 100
         nProdA: 102
        nProdAt: 102
        nNewton: 0
    timeProject: 2.7146
    timeMatProd: 0.0573
        itnLSQR: 0
        options: [1x1 struct]
      timeTotal: 3.5581
         xNorm1: [100x1 double]
         rNorm2: [100x1 double]
         lambda: [100x1 double]
```



Published with MATLAB® 7.10