Perception in Robotics
Term 3, 2022. PS3

Galkin Dmitry

Task 1.A

```
Status of graph: 1Nodes and 1Factors.
Printing NodePose2d: 0, state =
180
 50
  0
and neighbour factors 1
Printing Factor: 0, obs=
180
 50
  0
 Residuals=
9.13554e+242
1.44873e+166
3.00596e+180
and Information matrix
1e+12    -0    -0
    0 1e+12    -0
    0     0 1e+12
 Calculated Jacobian =
0 0 0
0 0 0
0 0 0
 Chi2 error = 0 and neighbour Nodes 1
```

Since no optimization has been done, the residuals
are not initialized (garbage values) and Jacobians are set to zero. And we observe initial state values.

Task 1.B

```
State values before adding the odometry factor:  [[180.]
 [ 50.]
 [  0.]]
State values after adding the odometry factor:  [[180.]
 [ 50.]
 [  0.]] [[190.]
 [ 50.]
 [  0.]]
```

State values before and after adding the odometry factor

Task 1.C

```
Printing NodePose2d: 0, state =
180
 50
  0
and neighbour factors 2
Printing NodePose2d: 1, state =
190
 50
  0
and neighbour factors 3
Printing NodeLandmark2d: 2, state =
460.016
 55.233
and neighbour factors 1
Printing NodeLandmark2d: 3, state =
312.493
-2.8605
and neighbour factors 1
```

Task 1.D

```
Status of graph: 4Nodes and 4Factors.
Printing NodePose2d: 0, state =
180
 50
  0
and neighbour factors 2
Printing NodePose2d: 1, state =
190
 50
  0
and neighbour factors 3
Printing NodeLandmark2d: 2, state =
480.221
31.7736
and neighbour factors 1
Printing NodeLandmark2d: 3, state =
 323.79
36.7862
and neighbour factors 1
```

```
Printing Factor: 0, obs=
180
 50
  0
 Residuals=
6.9462e-310
6.9462e-310
6.9462e-310
and Information matrix
1e+12    -0    -0
    0 1e+12    -0
    0     0 1e+12
 Calculated Jacobian =
0 0 0
0 0 0
0 0 0
 Chi2 error = 0 and neighbour Nodes 1
Printing Factor:1, obs=
 0
10
 0
 Residuals=
 2.12988e-316
2.12987e-316
2.16289e-316
and Information matrix
    4    -0    -0
    0   200 -1000
    0 -1000 10000
 Calculated Jacobian =
2.16284e-316 2.12993e-316 2.12989e-316 2.16285e-316 2.12992e-316 2.11199e-316
2.12988e-316 2.12986e-316 2.12992e-316 2.12294e-316 2.12992e-316 2.15911e-316
2.16078e-316 2.16089e-316 2.15823e-316 2.16097e-316 2.16285e-316   2.162e-316
 Chi2 error = 0 and neighbour Nodes 2
```

```
Printing Factor: 2, obs=
   290.792
-0.0627194
 Residuals=
0
0
and Information matrix
   0.01      -0
      0 32.8281
 Calculated Jacobian =
2.12989e-316 2.16285e-316 2.12992e-316 2.11199e-316 2.12988e-316
2.12986e-316 2.12992e-316 2.12294e-316 2.12992e-316 2.15911e-316
 Chi2 error = 0 and neighbour Nodes 2
Printing Factor: 3, obs=
   134.441
-0.0984455
 Residuals=
0
0
and Information matrix
   0.01      -0
      0 32.8281
 Calculated Jacobian =
 6.9462e-310 6.94618e-310 6.94618e-310 6.94618e-310 6.94618e-310
6.94618e-310  6.9462e-310 6.94618e-310 6.94618e-310 6.94618e-310
 Chi2 error = 0 and neighbour Nodes 2
```

```
Status of graph: 4Nodes and 4Factors.
Printing NodePose2d: 0, state =
         180
          50
-1.07852e-44
and neighbour factors 2
Printing NodePose2d: 1, state =
        190
         50
4.00593e-36
and neighbour factors 3
Printing NodeLandmark2d: 2, state =
480.221
31.7736
and neighbour factors 1
Printing NodeLandmark2d: 3, state =
 323.79
36.7862
and neighbour factors 1
```

```
Printing Factor: 0, obs=
180
 50
  0
 Residuals=
0
0
0
and Information matrix
1e+12    -0    -0
    0 1e+12    -0
    0     0 1e+12
 Calculated Jacobian =
1 0 0
0 1 0
0 0 1
 Chi2 error = 0 and neighbour Nodes 1
Printing Factor:1, obs=
 0
10
 0
 Residuals=
 0
0
0
and Information matrix
    4    -0    -0
    0   200 -1000
    0 -1000 10000
 Calculated Jacobian =
 1  0 -0 -1  0  0
 0  1 10  0 -1  0
 0  0  1  0  0 -1
 Chi2 error = 0 and neighbour Nodes 2
```

```
Printing Factor: 2, obs=
   290.792
-0.0627194
 Residuals=
          0
1.38778e-17
and Information matrix
   0.01      -0
      0 32.8281
 Calculated Jacobian =
   -0.998034    0.0626783           0     0.998034   -0.0626783
-0.000215543  -0.00343212          -1  0.000215543   0.00343212
 Chi2 error = 3.16123e-33 and neighbour Nodes 2
Printing Factor: 3, obs=
   134.441
-0.0984455
 Residuals=
-5.68434e-14
-4.16334e-17
and Information matrix
   0.01      -0
      0 32.8281
 Calculated Jacobian =
   -0.995158    0.0982866           0     0.995158   -0.0982866
-0.000731075  -0.00740218          -1  0.000731075   0.00740218
 Chi2 error = 1.61843e-29 and neighbour Nodes 2
```