

Probabilistic Robotics Course

EXERCISE I – VREP & G2O

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What will we do today?

- VREP

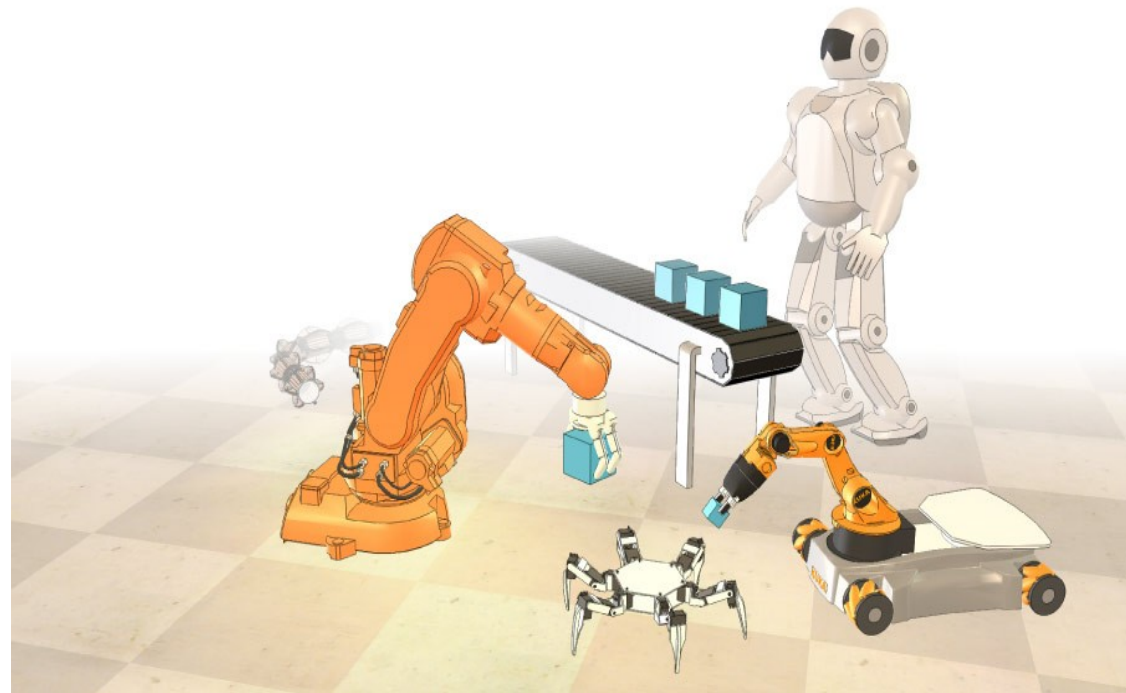
- Collect a noisy dataset

- g2o

- Load and optimize

Virtual Robot Experimentation Platform (VREP)

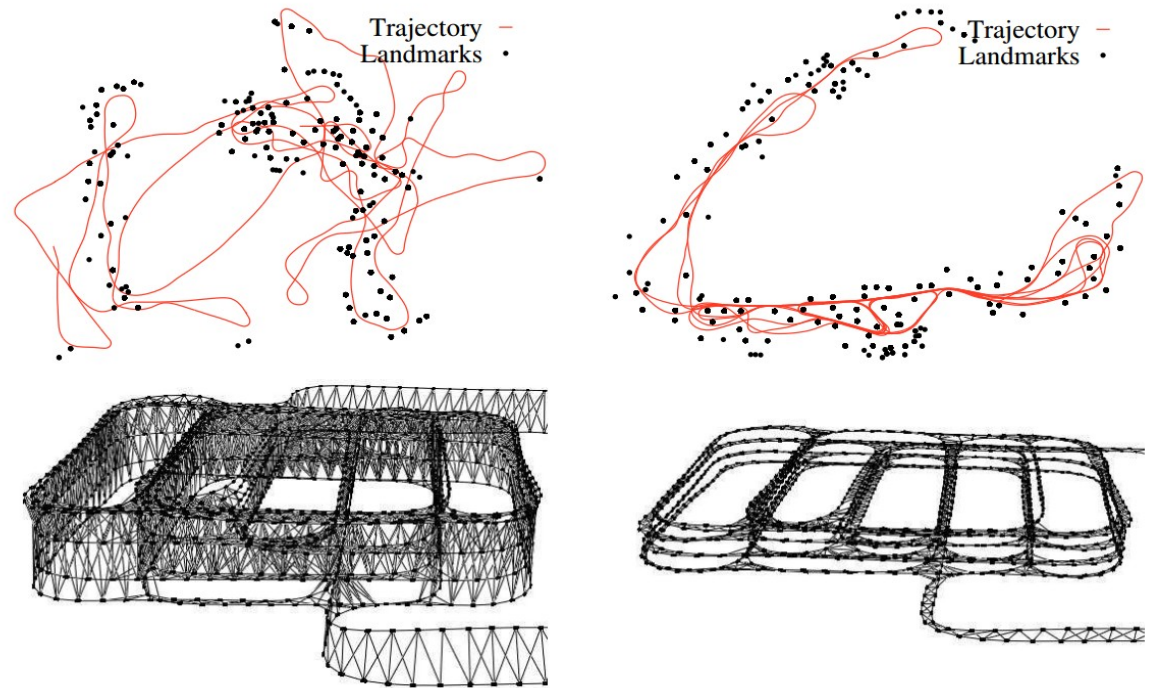
- Lots of robot models
- Lots of API
- C/C++, Python, Java, Lua, Matlab/Octave, Urbi, ...



V-REP: a Versatile and Scalable Robot Simulation Framework. E.Rohmer, S.Singh M.Freese. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Tokyo 2013.

g2o: A General Framework for Graph Optimization

- Open-source
- C++ framework for optimizing graph-based nonlinear error functions



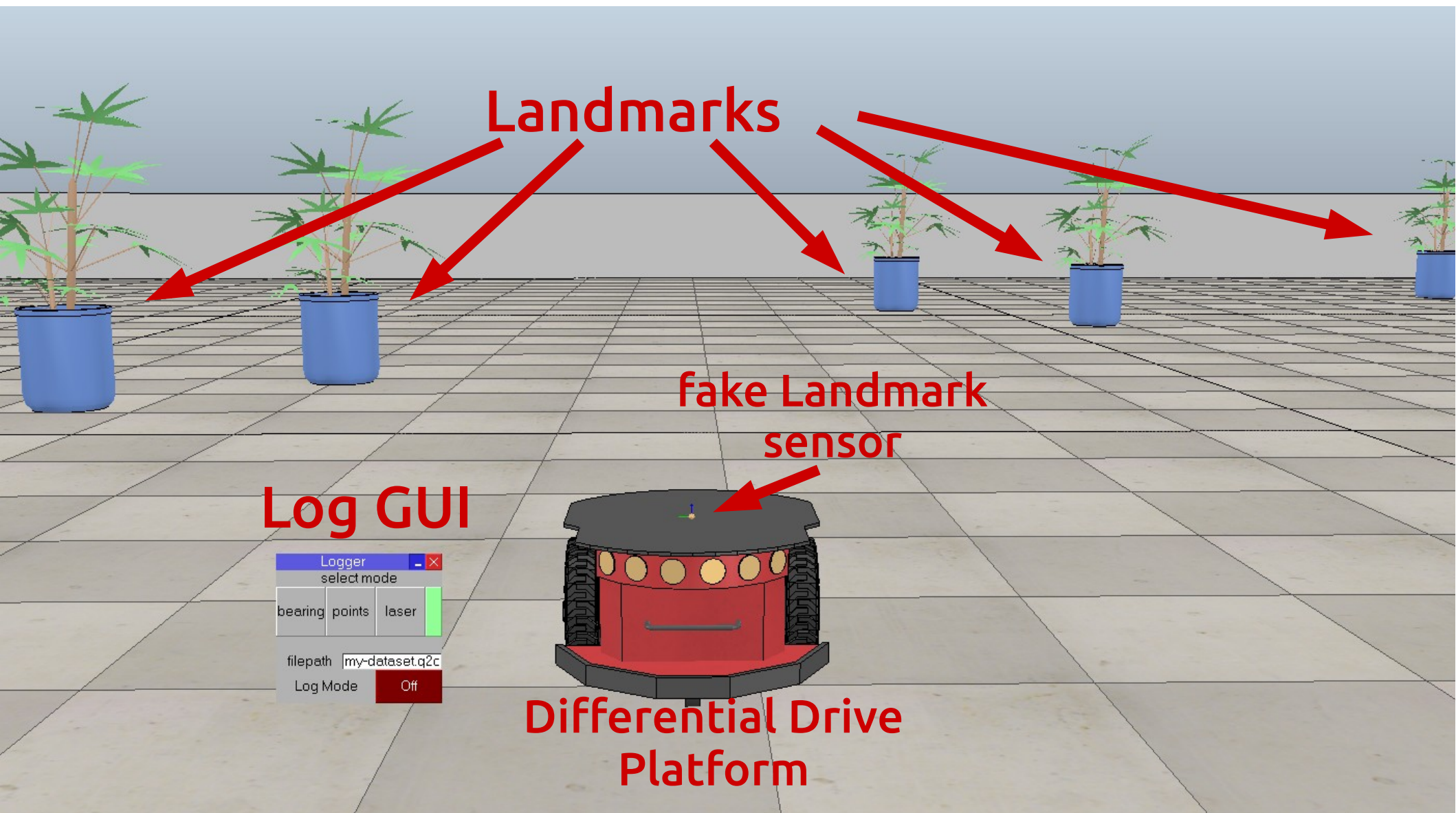
[g2o: A General Framework for Graph Optimization](#), Rainer Kuemmerle, Giorgio Grisetti, Hauke Strasdat, Kurt Konolige, and Wolfram Burgard. IEEE International Conference on Robotics and Automation (ICRA), 2011

Let's start

prob-robot-scene.ttt



prob-robot-scene.ttt



Output File in g2o format

- **List of Landmarks**

- VERTEX_XY landID land.x land.y

```
VERTEX_XY 1 -2.9500 -3.6000
VERTEX_XY 2 6.0000 6.2000
VERTEX_XY 3 7.1000 4.7750
```

- **List of Poses**

- VERTEX_SE2 posID pos.x pos.y pos.θ

```
VERTEX_SE2 1100 0.0805 -0.4000 0.1388
VERTEX_SE2 1101 0.0805 -0.4000 0.1388
```

- **List of Transitions**

- EDGE_SE2 fromID toID x y θ Σ

```
EDGE_SE2 1100 1101 -0.0000 0.0000 0.0000 ...
```

- **List of Point Observations**

- EDGE_SE2_XY posID landID x y Σ

```
EDGE_SE2_XY 1101 22 6.6204 -2.4239 1000 0 1000
EDGE_SE2_XY 1101 23 3.0447 2.1505 1000 0 1000
EDGE_SE2_XY 1101 24 3.8198 1.3756 1000 0 1000
EDGE_SE2_XY 1101 25 1.5205 -2.5748 1000 0 1000
```

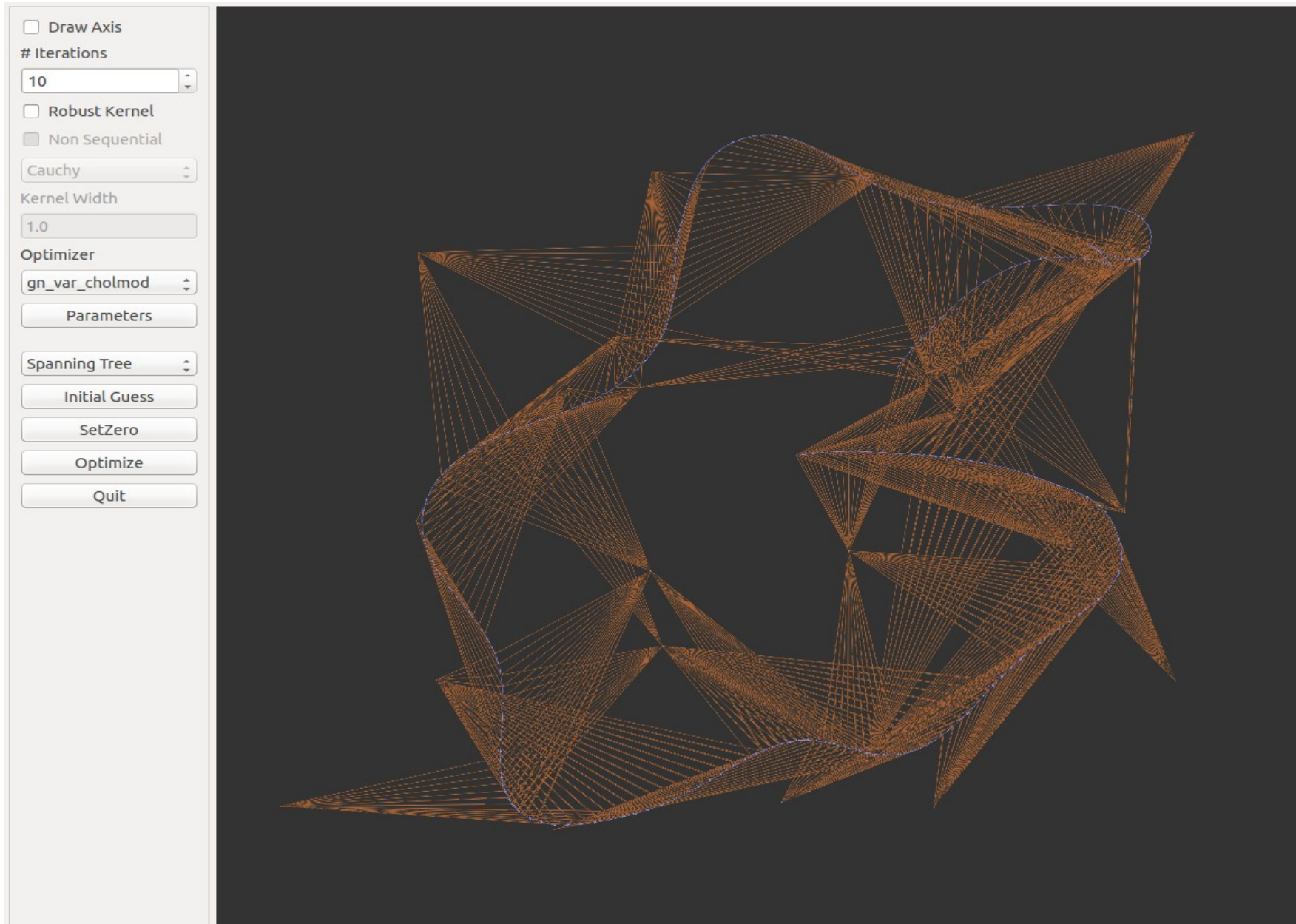
- **List of Bearing Observations**

- EDGE_BEARING_SE2_XY posID landID x y Σ

```
EDGE_BEARING_SE2_XY 1101 22 -0.3509 57295.8
EDGE_BEARING_SE2_XY 1101 23 0.6149 57295.8
EDGE_BEARING_SE2_XY 1101 24 0.3457 57295.8
EDGE_BEARING_SE2_XY 1101 25 -1.0372 57295.8
```

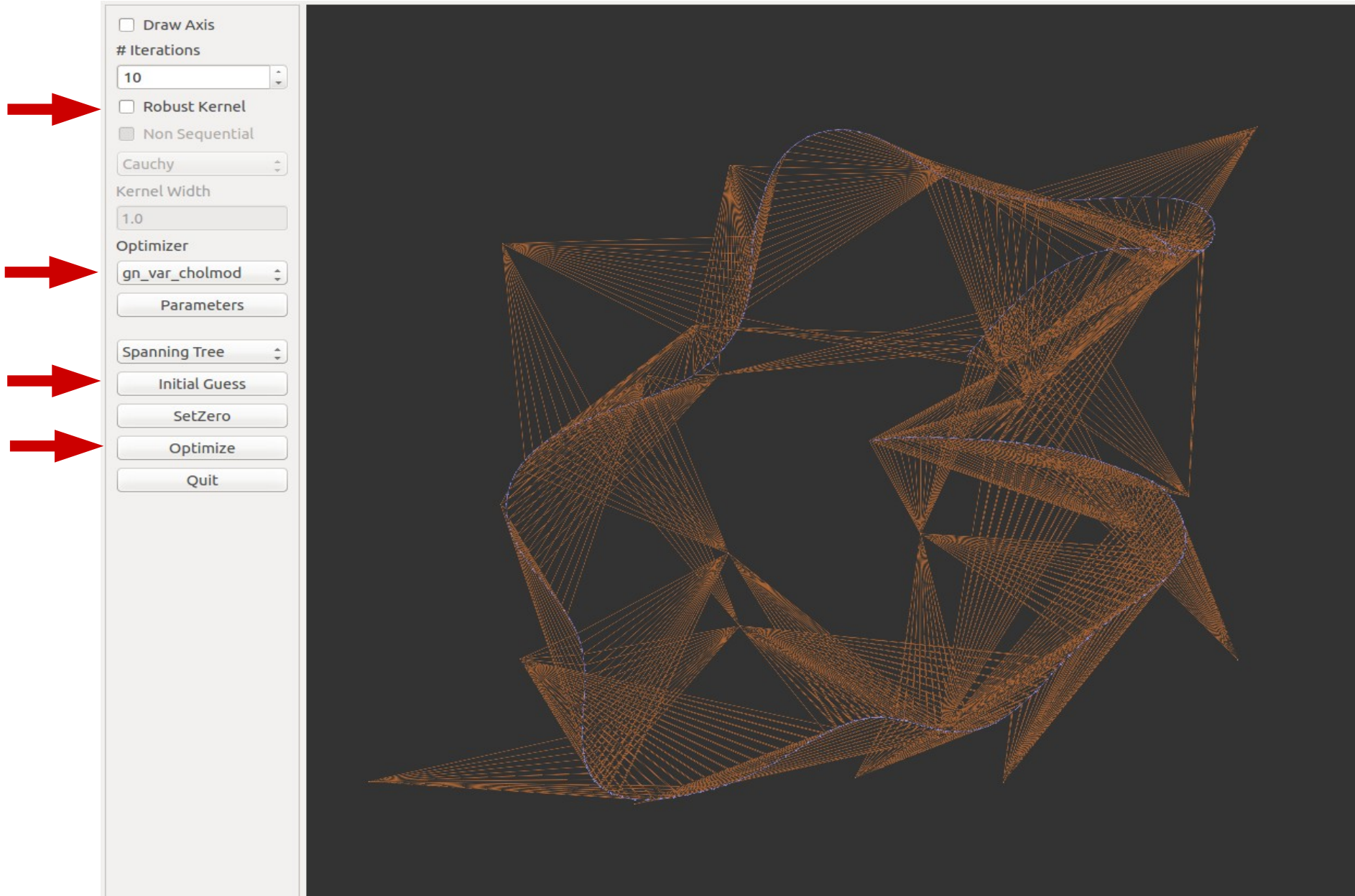

Load in g2o

/src/g2o/bin/g2o_viewer



Load in g2o

/src/g2o/bin/g2o_viewer



Next ...

- Load the generated datasets in octave

- Localization

- SLAM

