* **Eigen**

Introduction: C++ template library for linear algebra: matrices, vectors, numerical solvers, and related algorithms.

Installation: In order to use [**Eigen**](https://eigen.tuxfamily.org/dox/namespaceEigen.html), you just need to download and extract [**Eigen**](https://eigen.tuxfamily.org/dox/namespaceEigen.html)'s source code (see [the wiki](http://eigen.tuxfamily.org/index.php?title=Main_Page#Download) for download instructions). In fact, the header files in the [**Eigen**](https://eigen.tuxfamily.org/dox/namespaceEigen.html) subdirectory are the only files required to compile programs using [**Eigen**](https://eigen.tuxfamily.org/dox/namespaceEigen.html). The header files are the same for all platforms. It is not necessary to use CMake or install anything.

Tutorial: <https://eigen.tuxfamily.org/dox/GettingStarted.html>

* **Sophus**

Introduction: C++ implementation of Lie Groups

Installation:

git clone http://github.com/strasdat/Sophus.git

**then go to the folder**

mkdir build

cd build

cmake ..

make

Tutorial: Please refer to page 78-80 of [slambook-en.pdf](https://github.com/gaoxiang12/slambook-en/blob/master/slambook-en.pdf)

* **OpenCV**

Introduction: Computer vision library

Installation: [Install OpenCV C C++ in Ubuntu 18.04 LTS : Step by Step Guide](http://techawarey.com/programming/install-opencv-c-c-in-ubuntu-18-04-lts-step-by-step-guide/)

Tutorial:

Full tutorial: <https://docs.opencv.org/master/d9/df8/tutorial_root.html>

* **Pangolin**

Introduction: Library based on OpenGL, for the visualization of trajectory

Installation: Follow the instructions in README:

<https://github.com/stevenlovegrove/Pangolin>

Tutorial: Please refer to page 61-63 of [slambook-en.pdf](https://github.com/gaoxiang12/slambook-en/blob/master/slambook-en.pdf)

* **Ceres**

Introduction: C++ library for modeling and solving large, complicated optimization problems.

Installation: <http://ceres-solver.org/installation.html>

Tutorial: <http://ceres-solver.org/tutorial.html>