Lecture 1

2.1 安装软件

```
sudo apt-get install <var>
```

安装路径一般在/usr/share

2.2 环境变量

环境变量是PATH；
添加环境变量：

```
export PATH = <var>:$PATH
```

2.3 根目录的目录结构

- /home 用户目录;
- /dev 系统设备文件;
- /etc 系统配置文件；
- /sbin 系统管理命令

2.4 给a.sh添加可执行权限：

```
chmod +x a.sh
```

2.5 修改所有者：

```
chmown xiang:xiang a.sh
```

3.1 应用场景

- 自动驾驶
- 3D重建

- 增强现实
- 无人机建图，定位

3.2 定位与建图的关系

准确的定位需要精确的地图，精确的地图来自于准确的定位
因为只有建立好地图才能更好的定位

3.3 SLAM发展历程

- 史前时期 根据已知地图来定位
- EKF主流 1990-2005，用EKF模型求解SLAM
- BA转型时期 2006 - 2010
- 前沿研究，更多的传感器，更复杂的环境

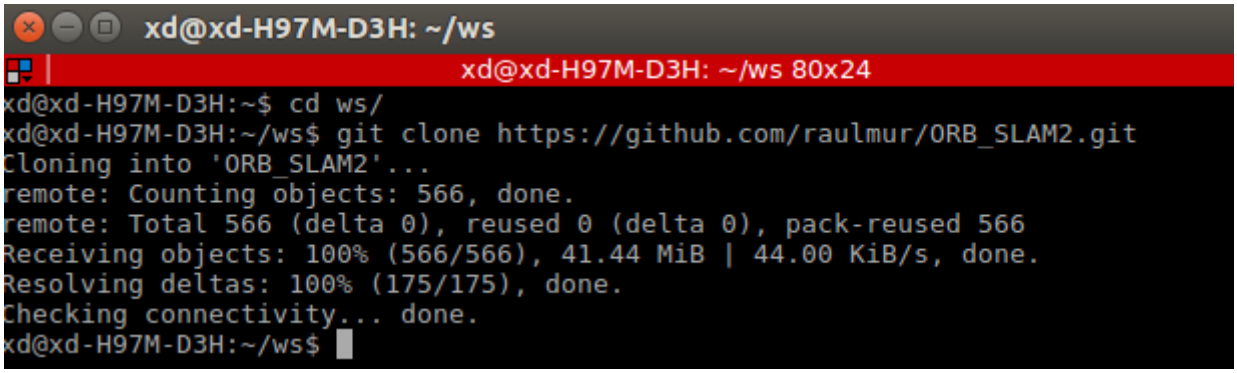
3.4 经典文献

- D. Scaramuzza, F. Fraundorfer, "Visual Odometry: Part I - The First 30 Years and Fundamentals IEEE Robotics and Automation Magazine", Volume 18, issue 4, 2011.
- F. Fraundorfer and D. Scaramuzza, "Visual Odometry : Part II: Matching, Robustness, Optimization, and Applications," in IEEE Robotics & Automation Magazine, vol. 19, no. 2, pp. 78-90, June 2012.
- Stephan Weiss and Roland Siegwart. Real-Time Metric State Estimation for Modular Vision-Inertial Systems. in IEEE International Conference on Robotics and Automation (ICRA), 2011.
- Dorian Gálvez-López and Juan D. Tardós. Bags of Binary Words for Fast Place Recognition in Image Sequences. IEEE Transactions on Robotics, vol. 28, no. 5, pp. 1188-1197, 2012.

4 CMAKE

见sayhello文件夹

5.1 下载ORB_SLAM2代码

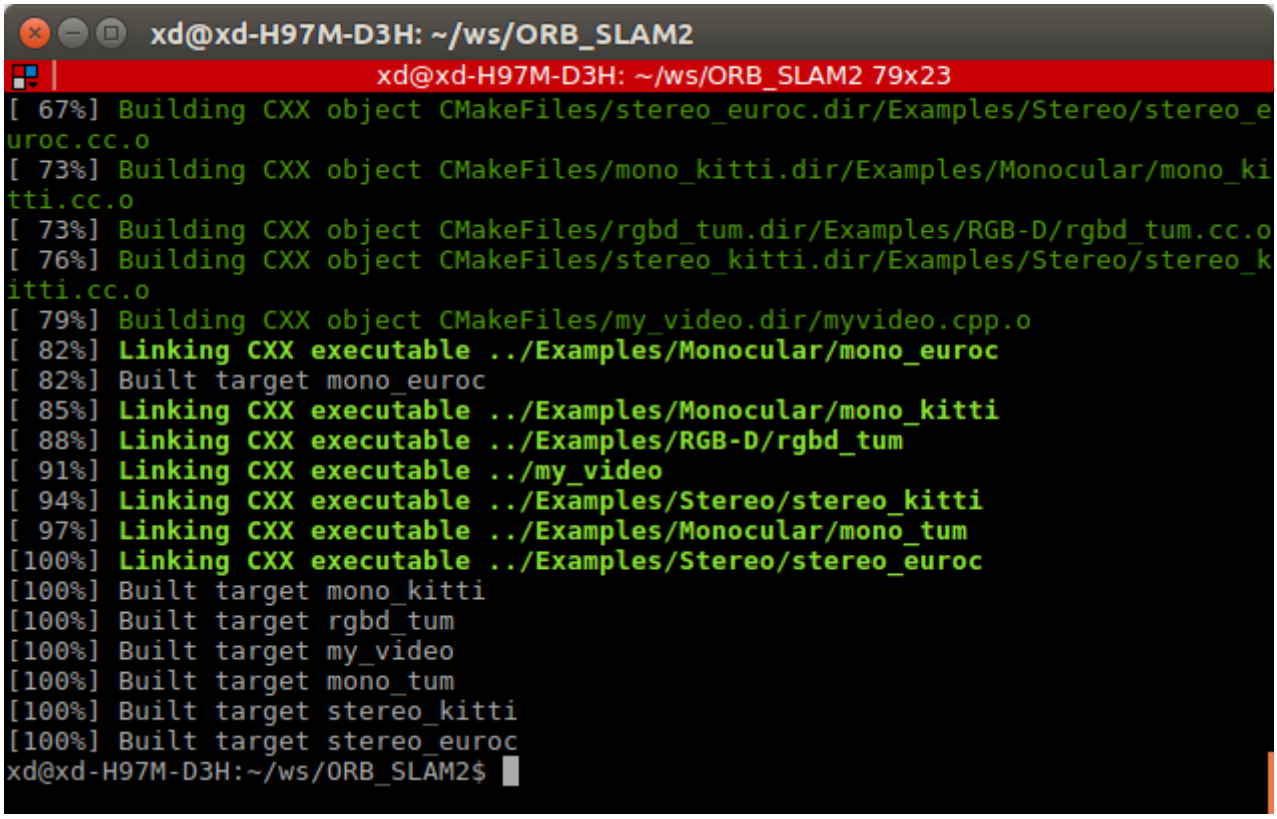


5.2

- (a) shared library lib/libORB_SLAM2.so, executable files:rgbd_tum, stero_kitti, mono_tum, my_video, stereo_euroc, mono_euroc, mono_kitti
- (b) include/包含了头文件；src/包含了局部建图，回环检测，跟踪；Examples/包含了单目，双目，RGBD摄像头的运行样例
- (c) ldd rgbd_tum
  linux-vdso.so.1 libORB_SLAM2.so libopencv_imgcodecs.so.3.3 libopencv_core.so.3.3 libpangolin.so libGL.so.1 libstdc++.so.6 libgcc_s.so.1 libc.so.6 libDBoW2.so libg2o.so libopencv_calib3d.so.3.3 libopencv_cudawarping.so.3.3 libopencv_features2d.so.3.3 libopencv_highgui.so.3.3 libopencv_imgproc.so.3.3 libpthread.so.0 libm.so.6 libjpeg.so.8 libwebp.so.5 libpng16.so.16 libjasper.so.1 libIlmImf-2_2.so.22 libHalf.so.12 libz.so.1 libdl.so.2 librt.so.1 libtbb.so.2 libcudart.so.8.0 libopenblas.so.0 libGLEW.so.1.13 libX11.so.6 libpython3.5m.so.1.0 libdc1394.so.22 libavcodec-ffmpeg.so.56 libavformat-ffmpeg.so.56 libavutil-ffmpeg.so.54 libswscale-ffmpeg.so.3 libOpenNI.so.0 libpng12.so.0 /lib64/ld-linux-x86-64.so.2 libnvidia-tls.so.384.90 libnvidia-glcore.so.384.90 libXext.so.6 libopencv_flann.so.3.3 libgomp.so.1 libnppc.so.8.0 libnppig.so.8.0 libmvec.so.1 libQt5Test.so.5 libQt5OpenGL.so.5 libQt5Widgets.so.5 libQt5Gui.so.5 libQt5Core.so.5 libIex-2_2.so.12 libIlmThread-2_2.so.12 libgfortran.so.3 libxcb.so.1 libexpat.so.1 libutil.so.1 libraw1394.so.11 libusb-1.0.so.0 libswresample-ffmpeg.so.1 libva.so.1 libzvbi.so.0 libxvidcore.so.4 libx265.so.79 libx264.so.148 libwavpack.so.1 libvpx.so.3 libvorbisenc.so.2 libvorbis.so.0 libtwolame.so.0 libtheoraenc.so.1 libtheoradec.so.1 libspeex.so.1 libsnappy.so.1 libshine.so.3 libschroedinger-1.0.so.0 libopus.so.0 libopenjpeg.so.5 libmp3lame.so.0 libgsm.so.1 libcrystalhd.so.3 liblzma.so.5 libssh-gcrypt.so.4 librtmp.so.1 libmodplug.so.1 libgme.so.0 libbluray.so.1 libgnutls.so.30 libbz2.so.1.0 libtinyxml.so.2.6.2 libgobject-2.0.so.0 libgthread-2.0.so.0 libglib-2.0.so.0 libicui18n.so.56 libicuuc.so.56 libicudata.so.56 libquadmath.so.0 libXau.so.6 libXdmcp.so.6 libudev.so.1 libsoxr.so.0 libnuma.so.1 libogg.so.0 liborc-0.4.so.0 libgcrypt.so.20 libgssapi_krb5.so.2 libhogweed.so.4 libnettle.so.6 libgmp.so.10 libxml2.so.2 libfontconfig.so.1 libfreetype.so.6 libp11-kit.so.0 libidn.so.11 libtasn1.so.6

libffi.so.6 libpcre.so.3 libgpg-error.so.0 libkrb5.so.3 libk5crypto.so.3 libcom_err.so.2 libkrb5support.so.0 libicuuc.so.55 libkeyutils.so.1 libresolv.so.2 libicudata.so.55

6.1 compile ORB_SLAM2

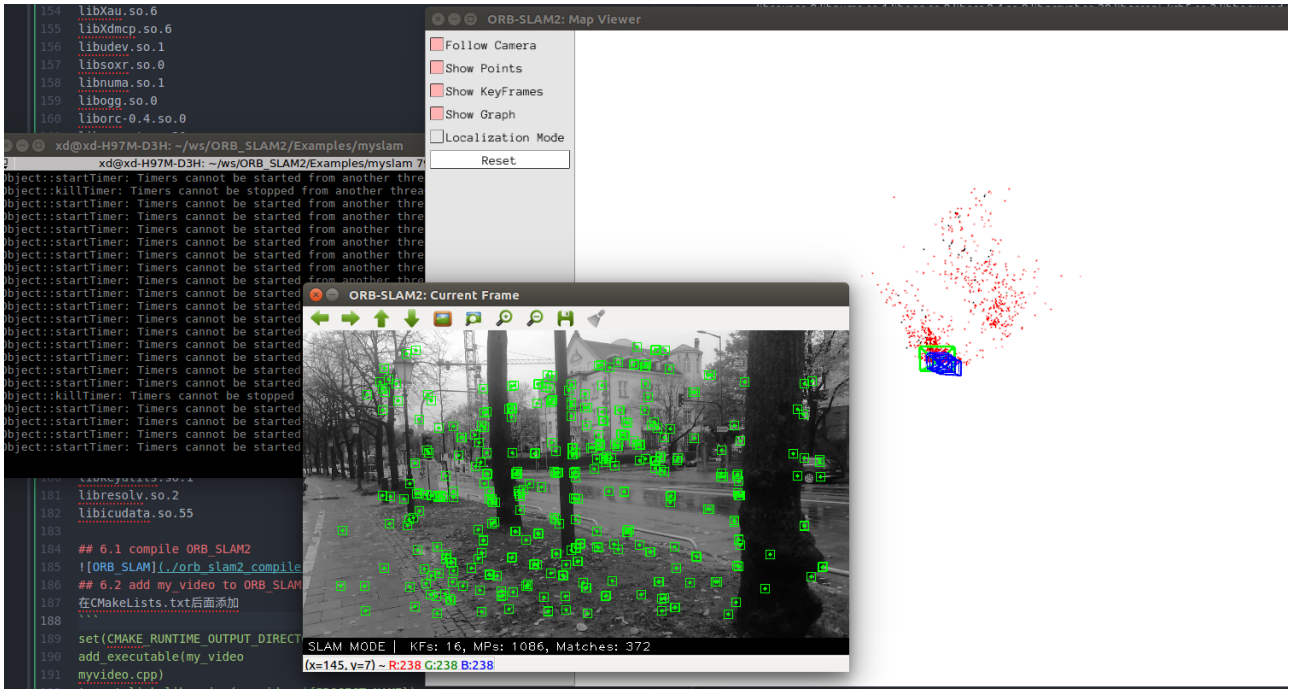


6.2 add my_video to ORB_SLAM2

在CMakeLists.txt后面添加

```
set(CMAKE_RUNTIME_OUTPUT_DIRECTORY ${PROJECT_SOURCE_DIR})
add_executable(my_video
myvideo.cpp)
target_link_libraries(my_video ${PROJECT_NAME})
```

6.2 运行截图


libXau.so.6
libXdmcp.so.6
libudev.so.1
libsoxr.so.0
libnuma.so.1
libogg.so.0
liborc-0.4.so.0
xd@xd-H97M-D3H: ~/ws/ORB_SLAM2/Examples/myslam
ORB-SLAM2: Map Viewer
Follow Camera
Show Points
Show KeyFrames
Show Graph
Localization Mode
Reset
ORB-SLAM2: Current Frame
SLAM MODE | KFs: 16, MPs: 1086, Matches: 372
(x=145, y=7) ~ R:238 G:238 B:238
libresolv.so.2
libicudata.so.55
6.1 compile ORB_SLAM2
6.2 add my_video to ORB_SLAM
在CMakeLists.txt后面添加
set(CMAKE_RUNTIME_OUTPUT_DIRECT
add_executable(my_video
myvideo.cpp)