Kinect for Ubuntu with Matlab Wrapper

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After breaking my head for over a week and trying to get Kinect working(either ubuntu or windows) with a wrapper in a language thats understandable(windows SDK for kinect is in C#) and easy to play with, I finally got it to work in Ubuntu with Matlab wrapper. Quite a few documentation exists out there but none of them tell you the minor bugs that need to be corrected for a successful installation. Before you proceed please note the versions that I have been successful in installing. OpenNI and NITE were latest versions and remaining are as follows:

OpenNI	:version 1.3.2.3(latest)
KinectSensor	:version 1
NITE	:version 1.4.1.2, (latest for ubuntu-10.10-64bit)
Ubuntu	:10.10, 64bit
Matlab	:R2010b, 64bit

Most of the installation process is documented in[1, 2, 3, 4]. The main addition of this document are the minor changes that are needed for the successful installation.

NOTE: In some of the commands the single/double quotaion mark are not exact(due to latex conversion). You'll have to manually retype the quotation marks for these commands.

1 Step 1: Prerequisites

We need to install a bunch of packages for all this to work. Thankfully, the readme file included with OpenNI lists all these. However, to make life easier, this is (as of writing) what you need to install, in addition to all the development packages you (hopefully) already have.

sudo apt-get install git build-essential python libusb-1.0-0-dev freeglut3-dev

There are also some optional packages that you can install, depending on whether you want documentation, Mono bindings, etc. Note that in the current version the install failed if you didn't have doxygen installed, even though it is listed as optional.

sudo apt-get install doxygen graphviz mono-complete

2 Step 2: OpenNI

We will be installing all the reqired files(OpenNI, Sensor modules and NITE) under the /home/*username* folder. However this is not necessary and can be installed anywhere you have space:

mkdir /home/*username*/kinect && cd /home/*username*/kinect

OpenNI is a framework for working with what they are calling natural interaction devices.Anyway, this is how it is installed: Check out from Git. OpenNI is hosted on Github, so checking it out is simple:

git clone https://github.com/OpenNI/OpenNI.git

From there, change into the Platform/Linux-x86/Build directory, and run the Makefile. Note that even though the directory is named x86, this same directory builds 64 bit versions just fine. So, don't fret if you're on 64bit Linux.

make && sudo make install

3 Step 3: Kinect Sensor Module

OpenNI doesn't actually provide anything for talking to the hardware, it is more just a framework for working with different sensors and devices. You need to install a Sensor module for actually doing the hardware interfacing. Think of an OpenNI sensor module as a device driver for the hardware. You'll also note on the OpenNI website that they have a Sensor module that you can download. Don't do this though, because that sensor module doesn't talk to the Kinect.

The sensor module you want is also on GitHub, but from a different user. So, we can check out the code. We also need to get the kinect branch, not master.

git clone https://github.com/boilerbots/Sensor
cd Sensor
git checkout kinect

The new version of OpenNI have some files renamed which is not reflected in the current version of Sensor. Simple fix:

cd /usr/include/ni
sudo ln -s CommonCppMakefile CommonMakefile

There is a typo in one of the makefiles in the older version of Sensor modules. This needs to be corrected as follows:

gedit /home/*username*/kinect/Sensor/Platform/Linux-x86/Build/XnFormats/Makefile

then edit line 6 to reflect the following:

USED_LIBS = XnCore OpenNI

The install process for the sensor is pretty much the same as for OpenNI itself:

cd /home/*username*/kinect/Sensor/Platform/Linux-x86/Build
make && sudo make install

On Ubuntu, regular users are only given read permission to unknown USB devices. The install script puts in some udev rules to fix this, but if you find

that none of the samples work unless you run them as root, try unplugging and plugging the Kinect back in again, to make the new rules apply.

4 Step 4: Test the OpenNI Samples

At this point, you have enough installed to get data from the Kinect. The easiest way to verify this is to run one of the OpenNI samples.

cd OpenNI/Platform/Linux-x86/Bin/Release
./Sample-NiSimpleViewer

You should see a yellow-black depth image. At this point, you're left with installing the higher level NITE module.

5 Step 5: Install NITE

Firstly, you need to obtain NITE. For some reason, the link on PrimeSense's homepage results in a 404 error. After quite a bit of searching around yesterday, I found the correct link:

http://www.openni.org/downloadfiles/opennimodules/openni-compliant-middleware-bi naries/33-latest-unstable

Download either the 32 or 64 bit version, depending on your platform. As of writing they only have versions for Ubuntu 10.10.

Extract the contents to the kinect folder under /home/*username*/kinect/NITE and:

cd /home/*username*/kinect/NITE/Nite-1.3.0.17/Data

Replace the Sample-User.xml, Sample-Tracking.xml, Sample-Scene.xml with those given in [1]. Basically you are replacing the Lincese line in these files to:

License vendor="PrimeSense" key="0KOIk2JeIBYClPWVnMoRKn5cdY4="

and adding a manuall configaration line:

MapOutputMode xRes="640" yRes="480" FPS="30"

after the Configaration tab. NOTE: These are read-only accessed and you'll have to have sudo permission to edit them.

Now you are ready to install NITE:

cd /home/*username*/kinect/NITE/
sudo ./install.sh

When Prompted enter the key: *0KOIk2JeIBYClPWVnMoRKn5cdY4=*(case sensitive). To check if NITE is installed properly you can run any of the example files in:

cd /home/*username*/kinect/NITE/Samples/Bin/Release

6 Step 6: Install Matlab Wrapper

Download the Matlab wrapper from the MathWorks site at:

http://www.mathworks.com/matlabcentral/fileexchange/30242-kinect-matlab?controll er=file_infos&download=true

Untar this to a convinent location and start your (64-bit)Matlab. In some cases OpenNI is not able to figure out your OS and platform. This can be corrected by:

sudo gedit /usr/include/ni/XnPlatform.h

and replacing line 74 with your platform specific line, for 32 or 64-bit ubunut:

#include "Linux-x86/XnPlatformLinux-x86.h"

In your Matlab terminal open the 'compile_cpp_files.m' file and replace line 25 and 26 with:

OpenNiPathInclude = '/usr/include/ni';
OpenNiPathLib = '/home/*username*/kinect/OpenNI/Platform/Linux-x86/Redist/Lib';

Also edit line 37 to:

mex('-v',['-L' OpenNiPathLib],'-lOpenNI',['-I' OpenNiPathInclude],Filename);

Now you are ready to mex the files needed for the wrapper. Run the 'compile_cpp_files.m' file. After this to use the IR nodes edit the lincese line in file '/Config/SamplesIRConfig.xml' (in the untar-ed matlab wrapper location) to:

License vendor="PrimeSense" key="0KOIk2JeIBYClPWVnMoRKn5cdY4="

Note: the resolution for IR node might not be supported and hence you might need to change the manual configaration line to:

MapOutputMode xRes="640" yRes="480" FPS="30"

You are now ready to play with the matlab wrapper for kinect on ubuntu!

References

[1] http://kinecthesis.bakedmac.com/2011/01/11/installing-openni-kinect-drivers-and -nite-on-mac-os-x-10-6/

[2] http://www.20papercups.net/programming/kinect-on-ubuntu-with-openni/

[3] http://davetaz-blog.blogspot.com/2011/03/installing-kinect-on-ubuntu-full-guide .html?showComment=1312280502324#c2367737762541647280

[4] http://www.mathworks.com/matlabcentral/fileexchange/30242-kinect-matlab