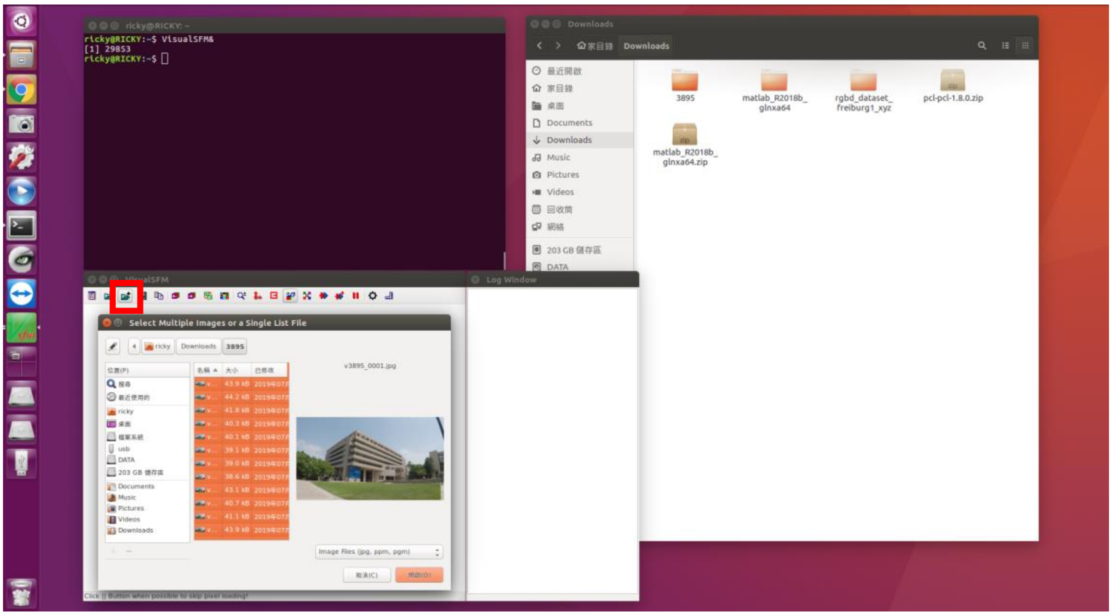
Build openMVS on Ubuntu 16.04 Desktop 64-bit

```
#prepare and empty machine for building
sudo apt-get update -qq && sudo apt-get install -qq
sudo apt-get -y install build-essential git mercurial cmake libpng-dev libjpeg-dev libtiff-dev libglu1-mesa-dev libxmu-dev libxi-dev
main_path=`pwd`

#Eigen (Required)
hg clone https://bitbucket.org/eigen/eigen#3.2
mkdir eigen_build && cd eigen_build
cmake . ../eigen
make && sudo make install
cd ..

#Boost (Required)
sudo apt-get -y install libboost-iostreams-dev libboost-program-options-dev libboost-system-dev libboost-serialization-dev

#OpenCV (Required)
sudo apt-get -y install libopencv-dev

#CGAL (Required)
sudo apt-get -y install libcgal-dev libcgal-qt5-dev

#VCGLib (Required)
git clone https://github.com/cdcseacave/VCG.git vcglib

#Ceres (Required)
sudo apt-get -y install libatlas-base-dev libsuitesparse-dev
git clone https://ceres-solver.googlesource.com/ceres-solver ceres-solver
mkdir ceres_build && cd ceres_build
cmake . ../ceres-solver/ -DMINIGLOG=ON -DBUILD_TESTING=OFF -DBUILD_EXAMPLES=OFF
make -j2 && sudo make install
cd ..
```

```
#GLFW3 (Optional)
sudo apt-get -y install freeglut3-dev libglew-dev libglfw3-dev

#OpenMVS
git clone https://github.com/cdcseacave/openMVS.git openMVS
mkdir openMVS_build && cd openMVS_build
cmake . ../openMVS -DCMAKE_BUILD_TYPE=Release -DVCG_ROOT="$main_path/vcglib"

#If you want to use OpenMVS as shared library, add to the CMake command
-DBUILD_SHARED_LIBS=ON

#Install OpenMVS library (Optional)
make -j2 && sudo make install
```

Step-by-Step tutorial from VSFM to openMVS

1. select images to load into VSFM system

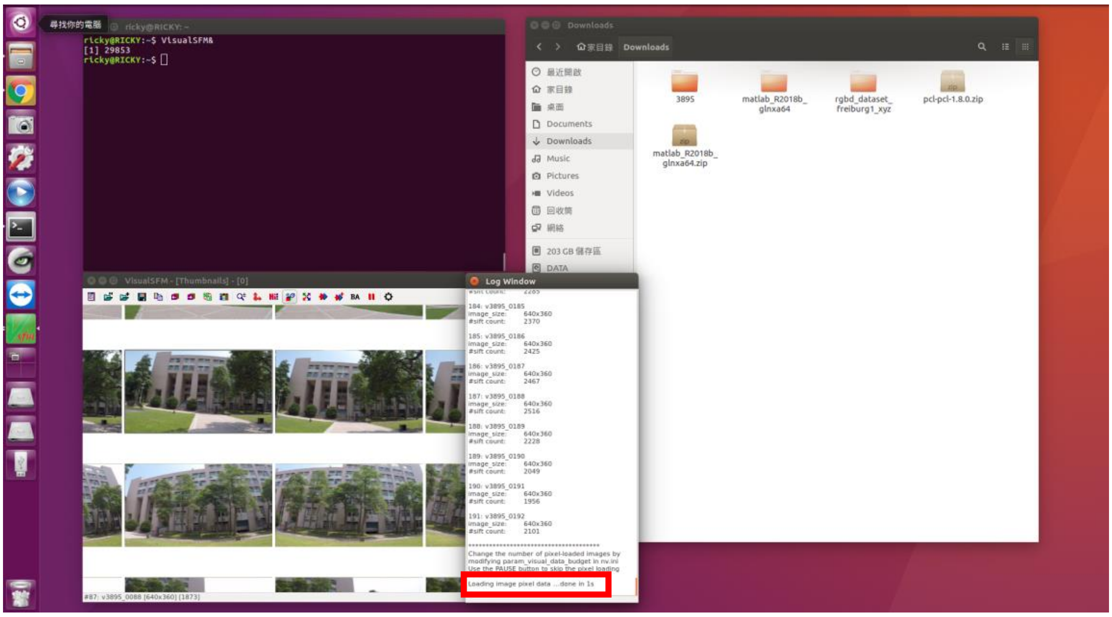


```
ricky@RICKY:~$ VisualSFM&
[1] 29853
ricky@RICKY:~$ 
```

ricky@RICKY: ~
Downloads
VisualSFM
Log Window
Select Multiple Images or a Single List File
v3895_0001.jpg
Image Files (jpg, ppm, pgm)
取消(C)
開啟(O)
3895
matlab_R2018b_glnxa64
rgbd_dataset_freiburg1_xyz
pcl-pcl-1.8.0.zip
matlab_R2018b_glnxa64.zip

Click || Button when possible to skip pixel loading

2. finish loading



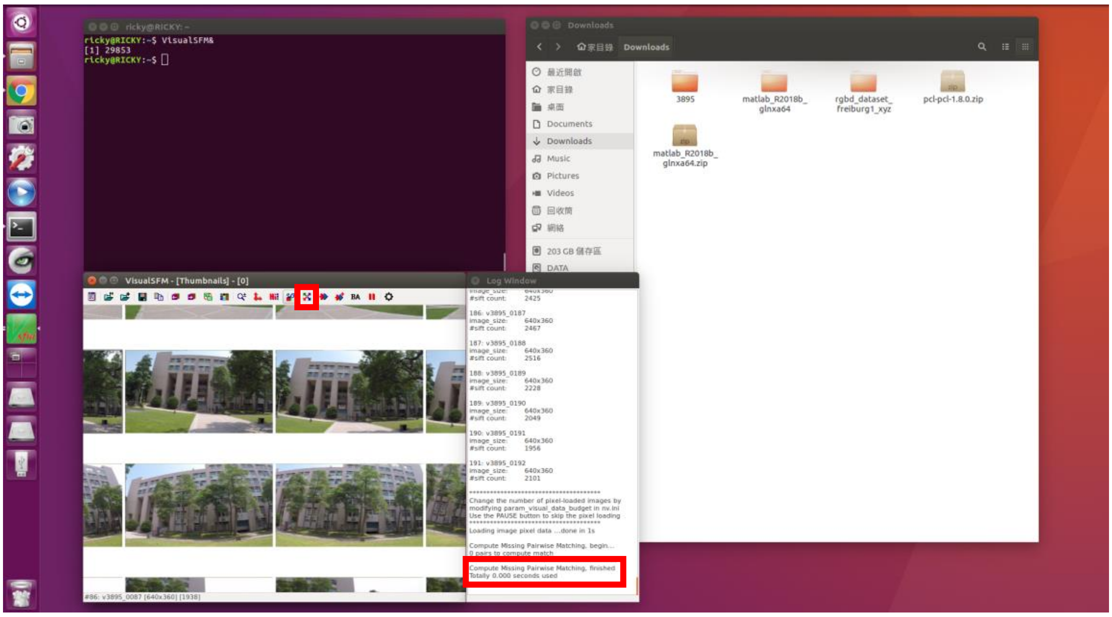
```
ricky@RICKY:~$ VisualSFM&
[1] 29853
ricky@RICKY:~$ 
```

```
184: v3895_0185
image_size:     640x360
#sift count:    2370

185: v3895_0186
image_size:     640x360
#sift count:    2425

186: v3895_0187
image_size:     640x360
#sift count:    2467

187: v3895_0188
image_size:     640x360
#sift count:    2516

188: v3895_0189
image_size:     640x360
#sift count:    2228

189: v3895_0190
image_size:     640x360
#sift count:    2049

190: v3895_0191
image_size:     640x360
#sift count:    1956

191: v3895_0192
image_size:     640x360
#sift count:    2101

*************************************
Change the number of pixel-loaded images by
modifying param_visual_data_budget in nv.ini
Use the PAUSE button to skip the pixel loading
Loading image pixel data ...done in 1s
```

#87: v3895_0088 [640x360] [1873]

ricky@RICKY: ~
Downloads
VisualSFM - [Thumbnails] - [0]
Log Window
3895
matlab_R2018b_glnxa64
rgbd_dataset_freiburg1_xyz
pcl-pcl-1.8.0.zip
matlab_R2018b_glnxa64.zip

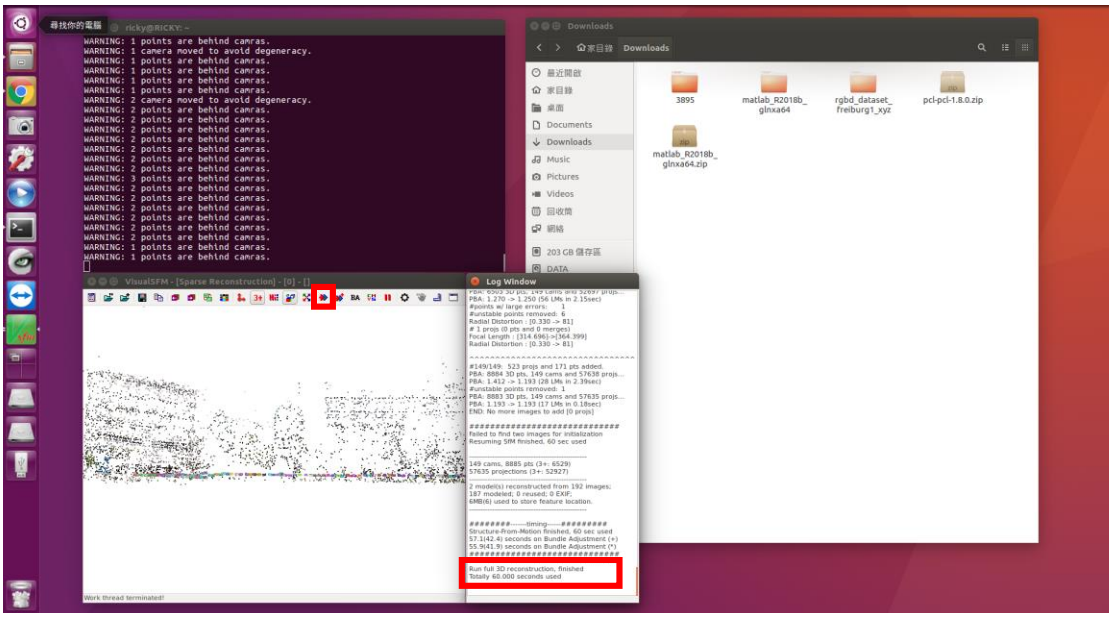
3. compute missing matches



```
ricky@RICKY:~$ VisualSFM&
[1] 29853
ricky@RICKY:~$ 
```

```
#sift count:      2425

186: v3895_0187
image_size:       640x360
#sift count:      2467

187: v3895_0188
image_size:       640x360
#sift count:      2516

188: v3895_0189
image_size:       640x360
#sift count:      2228

189: v3895_0190
image_size:       640x360
#sift count:      2049

190: v3895_0191
image_size:       640x360
#sift count:      1956

191: v3895_0192
image_size:       640x360
#sift count:      2101

************************************
Change the number of pixel-loaded images by
modifying param_visual_data_budget in nv.ini
Use the PAUSE button to skip the pixel loading
************************************
Loading image pixel data ...done in 1s

Compute Missing Pairwise Matching, begin...
0 pairs to compute match

Compute Missing Pairwise Matching, finished
Totally 0.000 seconds used
```

4. compute 3D reconstruction

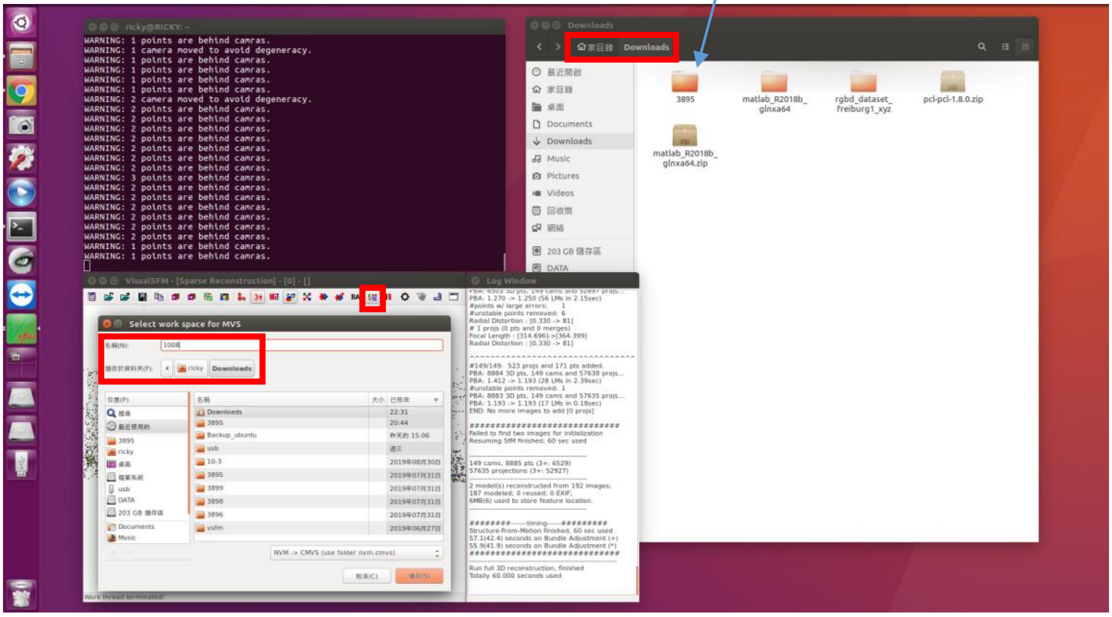


```
WARNING: 1 points are behind camras.
WARNING: 1 camera moved to avoid degeneracy.
WARNING: 1 points are behind camras.
WARNING: 1 points are behind camras.
WARNING: 1 points are behind camras.
WARNING: 1 points are behind camras.
WARNING: 2 camera moved to avoid degeneracy.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 3 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 1 points are behind camras.
WARNING: 1 points are behind camras.
```

```
PBA: 1.270 -> 1.250 (56 LMs in 2.15sec)
#points w/ large errors:     1
#unstable points removed:  6
Radial Distortion : [0.330 -> 81]
# 1 projs (0 pts and 0 merges)
Focal Length : [314.696]->[364.399]
Radial Distortion : [0.330 -> 81]

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
#149/149:  523 projs and 171 pts added.
PBA: 8884 3D pts, 149 cams and 57638 projs...
PBA: 1.412 -> 1.193 (28 LMs in 2.39sec)
#unstable points removed:  1
PBA: 8883 3D pts, 149 cams and 57635 projs...
PBA: 1.193 -> 1.193 (17 LMs in 0.18sec)
END: No more images to add [0 projs]

##############################
Failed to find two images for initialization
Resuming SfM finished, 60 sec used

----------------------------------------
149 cams, 8885 pts (3+: 6529)
57635 projections (3+: 52927)
----------------------------------------
2 model(s) reconstructed from 192 images;
187 modeled; 0 reused; 0 EXIF;
6MB(6) used to store feature location.
----------------------------------------

#########---------timing---------#########
Structure-From-Motion finished, 60 sec used
57.1(42.4) seconds on Bundle Adjustment (+)
55.9(41.9) seconds on Bundle Adjustment (*)
##############################

Run full 3D reconstruction, finished
Totally 60.000 seconds used
```

5. run dense reconstruction

(save the “xxx.nvm” file under the same directory as image directory located)



```
WARNING: 1 points are behind camras.
WARNING: 1 camera moved to avoid degeneracy.
WARNING: 1 points are behind camras.
WARNING: 1 points are behind camras.
WARNING: 1 points are behind camras.
WARNING: 1 points are behind camras.
WARNING: 2 camera moved to avoid degeneracy.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 3 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 2 points are behind camras.
WARNING: 1 points are behind camras.
WARNING: 1 points are behind camras.
```

Select work space for MVS

名稱(N): 1008

儲存於資料夾(F): ◂ ricky Downloads

位置(P)
搜尋
最近使用的
3895
ricky
桌面
檔案系統
usb
DATA
203 GB 儲存區
Documents
Music

名稱	大小	已修改
Downloads		22:31
3895		20:44
Backup_ubuntu		昨天的 15:06
usb		週三
10-3		2019年08月30日
3895		2019年07月31日
3899		2019年07月31日
3898		2019年07月31日
3896		2019年07月31日
vsfm		2019年06月27日

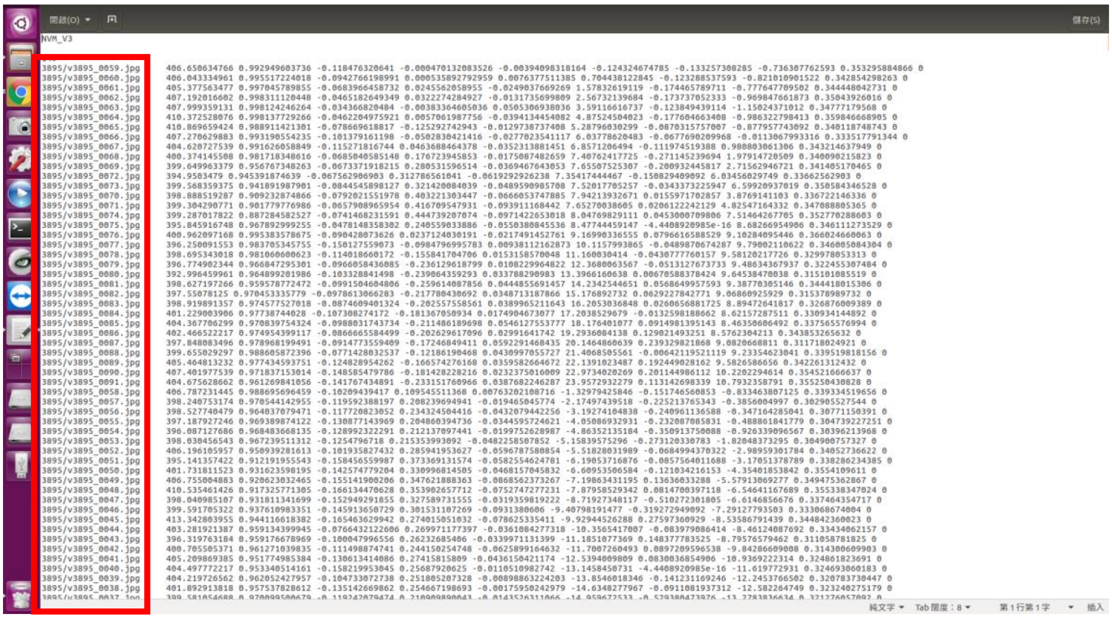
NVM -> CMVS (use folder nvm.cmvs)

取消(C)　儲存(S)

```
PBA: 6505 3D pts, 149 cams and 52697 projs...
PBA: 1.270 -> 1.250 (56 LMs in 2.15sec)
#points w/ large errors:      1
#unstable points removed:  6
Radial Distortion : [0.330 -> 81]
# 1 projs (0 pts and 0 merges)
Focal Length : [314.696]->[364.399]
Radial Distortion : [0.330 -> 81]

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
#149/149:  523 projs and 171 pts added.
PBA: 8884 3D pts, 149 cams and 57638 projs...
PBA: 1.412 -> 1.193 (28 LMs in 2.39sec)
#unstable points removed:  1
PBA: 8883 3D pts, 149 cams and 57635 projs...
PBA: 1.193 -> 1.193 (17 LMs in 0.18sec)
END: No more images to add [0 projs]

################################
Failed to find two images for initialization
Resuming SfM finished, 60 sec used

----------------------------------------
149 cams, 8885 pts (3+: 6529)
57635 projections (3+: 52927)
----------------------------------------
2 model(s) reconstructed from 192 images;
187 modeled; 0 reused; 0 EXIF;
6MB(6) used to store feature location.
----------------------------------------

#########-------timing------#########
Structure-From-Motion finished, 60 sec used
57.1(42.4) seconds on Bundle Adjustment (+)
55.9(41.9) seconds on Bundle Adjustment (*)
################################
----------------------------------------
Run full 3D reconstruction, finished
Totally 60.000 seconds used
```

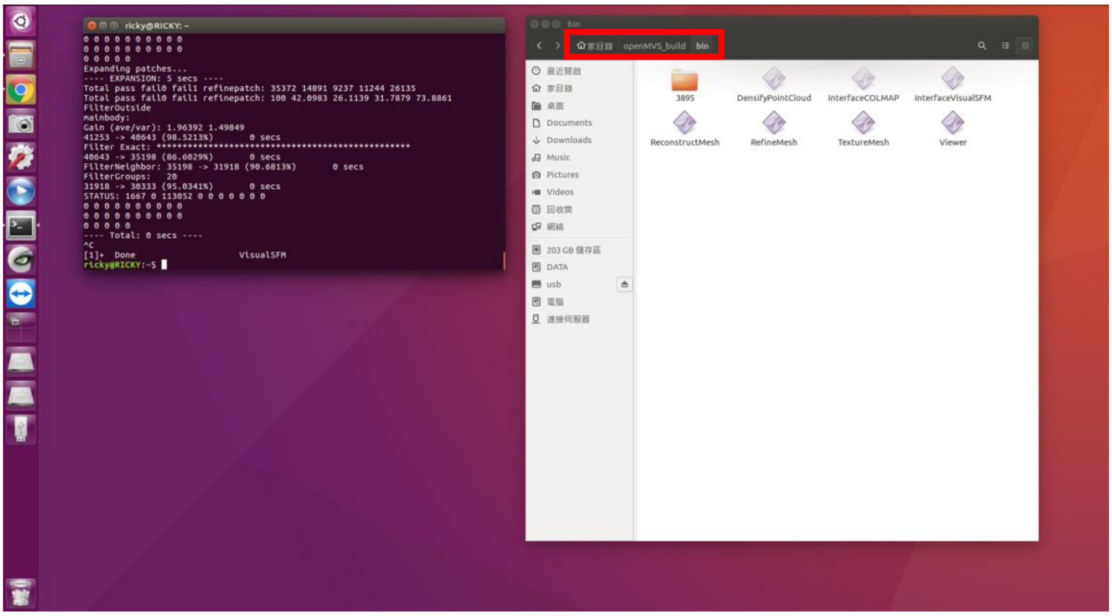
please check the file “xxx.nvm”

if the path is “your_image_directory/image_name”



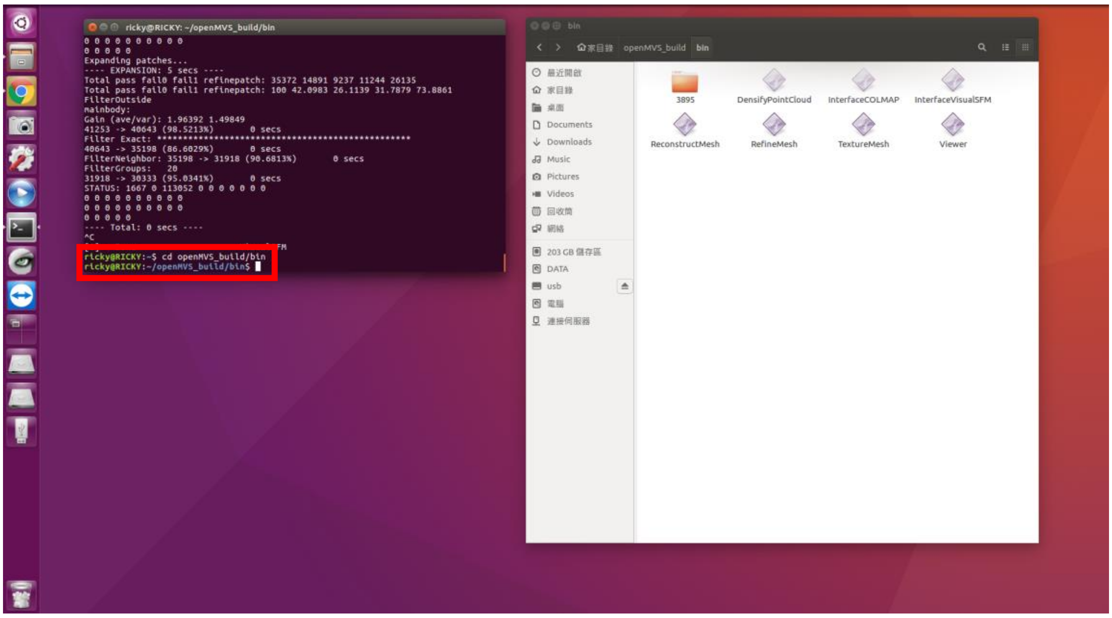
```
NVM_V3

3895/v3895_0059.jpg     406.650634766 0.992949603736 -0.118476320641 -0.000470132083526 -0.00394098318164 -0.124324674785 -0.133257308285 -0.736307762593 0.353295884866 0
3895/v3895_0060.jpg     406.043334961 0.995517224018 -0.0942766198991 0.000535892792959 0.0076377511385 0.704438122845 -0.123288537593 -0.821010901522 0.342854298263 0
3895/v3895_0061.jpg     405.377563477 0.997045789855 -0.0683966458732 0.0245562058955 -0.0249037669269 1.57832619119 -0.174465789711 -0.777647709502 0.344448042731 0
3895/v3895_0062.jpg     407.192016602 0.998311120448 -0.0465182649349 0.0322274284927 -0.0131735699809 2.56732139684 -0.173737052333 -0.969847661873 0.35043926016 0
3895/v3895_0063.jpg     407.999359131 0.998124246264 -0.034366820484 -0.00383364605036 0.0505306938036 3.59116616737 -0.123849439114 -1.15024371012 0.34777179568 0
3895/v3895_0064.jpg     410.372528076 0.998137729266 -0.0462204975921 0.0057061987756 -0.0394134454082 4.87524504023 -0.177604663408 -0.986322798413 0.359846668905 0
3895/v3895_0065.jpg     410.869659424 0.988911421301 -0.078669618817 -0.125292742943 -0.0129738737408 5.28796030299 -0.0870315757007 -0.877957743092 0.340118748743 0
3895/v3895_0066.jpg     407.270629883 0.993190554235 -0.101379161198 -0.0502830421416 -0.0277023541117 6.03778620483 -0.0677690209968 -0.0113067993316 0.333517791344 0
3895/v3895_0067.jpg     404.620727539 0.991626058849 -0.115271816744 0.0463688464378 -0.0352313881451 6.8571206494 -0.111974519388 0.980803061306 0.343214637949 0
3895/v3895_0068.jpg     400.374145508 0.981718348616 -0.0685040585148 0.176723945853 -0.0175087482659 7.40762417725 -0.271145239694 1.97914720509 0.340090215823 0
3895/v3895_0069.jpg     399.649963379 0.956767348263 -0.0673371918215 0.280531596514 -0.0369467643053 7.65507525307 -0.200932445817 2.71562946721 0.341405170465 0
3895/v3895_0072.jpg     394.9503479 0.945391874639 -0.067562906903 0.312786561041 -0.0619292926238 7.35417444467 -0.150829409092 6.03456029749 0.33662562903 0
3895/v3895_0073.jpg     399.568359375 0.941891987901 -0.0844545898127 0.321420084039 -0.0489590985708 7.52017705257 -0.0343373225947 6.59920937019 0.350584346528 0
3895/v3895_0070.jpg     398.888519287 0.909232874866 -0.0792021551978 0.403221303447 -0.0666053747885 7.94213932671 0.0155971702857 3.8769141103 0.336722146336 0
3895/v3895_0071.jpg     399.304290771 0.901779776986 -0.0657908965954 0.416709547931 -0.093911168442 7.65270038605 0.0206122242129 4.82547164332 0.347088805365 0
3895/v3895_0074.jpg     399.287017822 0.887284582527 -0.0741468231591 0.444739207074 -0.0971422653018 8.04769829111 0.0453000709806 7.51464267705 0.352770288603 0
3895/v3895_0075.jpg     395.845916748 0.967892999255 -0.0478148358302 0.240559033886 -0.0550380845536 8.47744459147 -4.4408920985e-16 8.68266954906 0.346111273529 0
3895/v3895_0076.jpg     400.962097168 0.995383578675 -0.090428073626 0.0237124030191 -0.0217491452761 9.16990336555 0.0796616588529 9.10284095446 0.366024660063 0
3895/v3895_0077.jpg     396.250091553 0.983705345755 -0.150127559073 -0.0984796995783 0.00938112162873 10.1157993865 -0.0489870674287 9.79002110622 0.346005084304 0
3895/v3895_0078.jpg     398.695343018 0.981060600623 -0.114018660172 -0.155841704706 0.0153158570048 11.160030414 -0.0430777760157 9.58120217726 0.329978053313 0
3895/v3895_0079.jpg     396.774902344 0.966847295301 -0.0966058436085 -0.236129618799 0.0108229964822 12.3680063567 -0.0513127673733 9.48634367937 0.322455307484 0
3895/v3895_0080.jpg     392.996459961 0.964899201986 -0.103328841498 -0.239064359293 0.033788290983 13.3966160638 0.00670588378424 9.64538470038 0.315101085519 0
3895/v3895_0081.jpg     398.627197266 0.959578772472 -0.0991504604806 -0.259614087856 0.0444855691457 14.2342544651 0.0568649957593 9.38770305146 0.344418015306 0
3895/v3895_0082.jpg     397.55078125 0.970453335779 -0.0978613066283 -0.217780430692 0.0348713187866 15.176892732 0.0629227842771 9.06860925929 0.315378989732 0
3895/v3895_0083.jpg     398.919891357 0.974577527018 -0.0874609401324 -0.202557558561 0.0389965211643 16.2053036848 0.0260656881725 8.89472641817 0.326876009389 0
3895/v3895_0084.jpg     401.229003906 0.97738744028 -0.107308274172 -0.181367050934 0.0174904673077 17.2038529679 -0.0132598188662 8.62157287511 0.330934144892 0
3895/v3895_0085.jpg     404.367706299 0.970839754324 -0.0988031743734 -0.211486189698 0.0546127553777 18.176401077 0.0914981395143 8.46350606492 0.337565576994 0
3895/v3895_0086.jpg     402.466522217 0.974954399117 -0.0866665584499 -0.202629617096 0.02991641742 19.2936084138 0.129021493251 8.5762304213 0.343853265632 0
3895/v3895_0087.jpg     397.848083496 0.978968199491 -0.0914773559409 -0.17246849411 0.0592291468435 20.1464860639 0.239329821868 9.0820668811 0.311718024921 0
3895/v3895_0088.jpg     399.655029297 0.988605872396 -0.0771428032537 -0.12186190468 0.0430997055727 21.4068505561 -0.00642119521119 9.23354623041 0.339519818156 0
3895/v3895_0089.jpg     405.464813232 0.977434593751 -0.124828954262 -0.166574276168 0.0359582664672 22.1391023487 0.192449028162 9.5826586656 0.342261312432 0
3895/v3895_0090.jpg     407.401977539 0.971837153014 -0.148585479786 -0.181428228216 0.0232375016009 22.9734020269 0.201144986112 10.2202294614 0.354521666637 0
3895/v3895_0091.jpg     404.675628662 0.961269841056 -0.141767434891 -0.233151760966 0.0387682246287 23.9572932279 0.113142698339 10.7932358791 0.355250430828 0
3895/v3895_0058.jpg     406.787231445 0.988695696459 -0.10209439417 0.109545511368 0.00763202108716 -1.32979425846 -0.151746560853 -0.833463807125 0.339334519656 0
3895/v3895_0057.jpg     398.240753174 0.970544142955 -0.119592388197 0.208239694941 -0.019465045774 -2.17497439518 -0.225213765343 -0.3856004997 0.302905527544 0
3895/v3895_0056.jpg     398.527740479 0.964037079471 -0.117720823052 0.234324504416 -0.0432079442256 -3.19274104838 -0.240961136588 -0.347164285041 0.30771150391 0
3895/v3895_0055.jpg     397.187927246 0.969389874122 -0.130877143969 0.204860394736 -0.0344595724621 -4.05086932931 -0.232087085831 -0.488861841779 0.304739227251 0
3895/v3895_0054.jpg     396.087127686 0.968483668135 -0.128992322291 0.212137097441 -0.0199752628987 -4.86352135184 -0.350913750088 -0.926339096567 0.30396213968 0
3895/v3895_0053.jpg     398.030456543 0.967239511312 -0.1254796718 0.215353993092 -0.0482258507852 -5.15839575296 -0.273120330783 -1.82048373295 0.304900757327 0
3895/v3895_0052.jpg     406.196105957 0.950939281613 -0.101935827432 0.285941953627 -0.0596787580854 -5.51828031989 -0.0684994370322 -2.98959301784 0.34052736622 0
3895/v3895_0051.jpg     395.141357422 0.912191955543 -0.158456559987 0.373369131574 -0.0582554624781 -6.19053716876 -0.0857564011688 -3.17051378789 0.338286234385 0
3895/v3895_0050.jpg     401.731811523 0.931623598195 -0.142574779204 0.330996814505 -0.0468157045832 -6.60953506584 -0.121034216153 -4.35401853842 0.3554109611 0
3895/v3895_0049.jpg     406.755004883 0.920623032465 -0.155141900206 0.347621888363 -0.0868562373267 -7.19863431195 0.13636033288 -5.57913069277 0.349475362867 0
3895/v3895_0048.jpg     410.535461426 0.917325771305 -0.166134470628 0.353902657712 -0.0752747277231 -7.87958529342 0.0814700397118 -6.54641167689 0.355338347024 0
3895/v3895_0047.jpg     398.040985107 0.931811341699 -0.152949291855 0.327589731555 -0.0319359819222 -8.71927348117 -0.510272301805 -6.6146856676 0.337464354717 0
3895/v3895_0046.jpg     399.591705322 0.937610983351 -0.145913650729 0.301531107269 -0.0931380606 -9.40798191477 -0.319272949092 -7.29127793503 0.333068674004 0
3895/v3895_0045.jpg     413.342803955 0.944116618382 -0.165463629942 0.274015051032 -0.078625335411 -9.92944526288 0.27597360929 -8.53586791439 0.344842360023 0
3895/v3895_0044.jpg     403.281921387 0.959134399945 -0.0766432122606 0.269971177397 -0.0361084277318 -10.3565417007 -0.083979086414 -8.46124087692 0.33434062157 0
3895/v3895_0043.jpg     396.319763184 0.959176678969 -0.100047996556 0.26232685406 -0.0339971131399 -11.1851077369 0.148377783525 -8.79576579462 0.311058781825 0
3895/v3895_0042.jpg     400.705505371 0.961271039835 -0.111498874741 0.244150254748 -0.0625899164632 -11.7007260493 0.0897209596538 -9.84286609008 0.314300609903 0
3895/v3895_0041.jpg     405.209869385 0.951774985384 -0.130613414086 0.27415815809 -0.0436150421174 -12.5394009809 0.0830036854906 -10.9369222314 0.324861823691 0
3895/v3895_0040.jpg     404.497772217 0.953340514161 -0.158219953045 0.25687920625 -0.0110510982742 -13.1458450731 -4.4408920985e-16 -11.619772931 0.324693060183 0
3895/v3895_0039.jpg     404.219726562 0.962052427957 -0.104733072738 0.251805207328 -0.00898863224203 -13.8546018346 -0.141231169246 -12.2453766502 0.320783730447 0
3895/v3895_0038.jpg     401.892913818 0.957537828612 -0.135142669862 0.254667198693 -0.00175950242979 -14.6348277967 -0.0911081937312 -12.582264749 0.323240275179 0
3895/v3895_0037.jpg     399.581054688 0.970099500679 -0.119242079474 0.210909890043 -0.0143526311066 -14.959672533 -0.529380473976 -13.2783836634 0.321276057092 0
```

6. move the image directory to ~/openMVS_build/bin/



```
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
Expanding patches...
---- EXPANSION: 5 secs ----
Total pass fail0 fail1 refinepatch: 35372 14891 9237 11244 26135
Total pass fail0 fail1 refinepatch: 100 42.0983 26.1139 31.7879 73.8861
FilterOutside
mainbody:
Gain (ave/var): 1.96392 1.49849
41253 -> 40643 (98.5213%)       0 secs
Filter Exact: ***************************************************
40643 -> 35198 (86.6029%)       0 secs
FilterNeighbor: 35198 -> 31918 (90.6813%)       0 secs
FilterGroups:   20
31918 -> 30333 (95.0341%)       0 secs
STATUS: 1667 0 113052 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
---- Total: 0 secs ----
^C
[1]+  Done                    VisualSFM
ricky@RICKY:~$ 
```

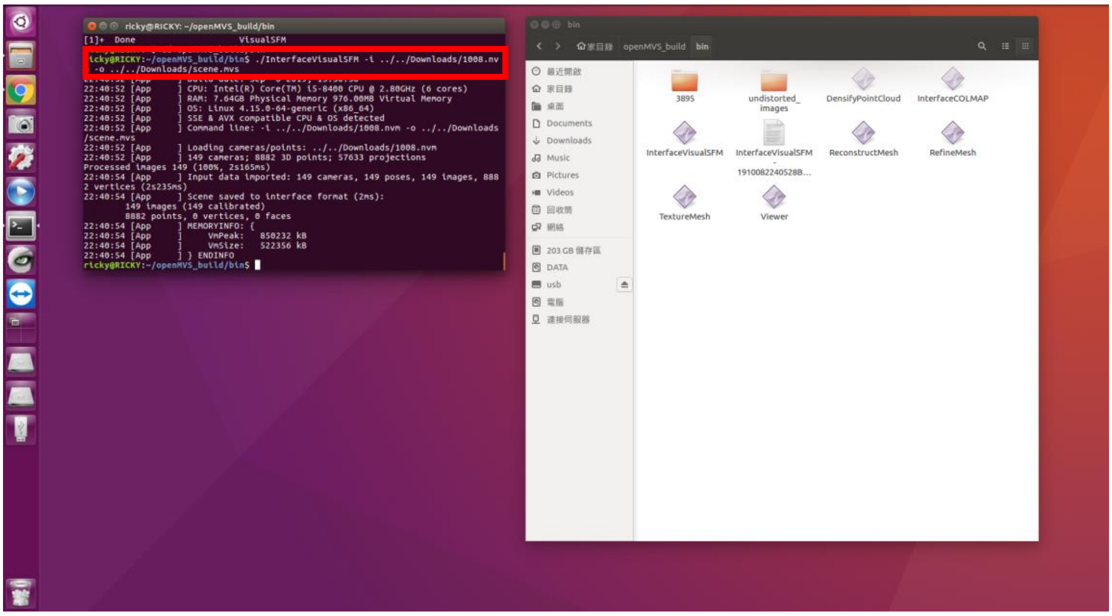
7. cd openMVS_build/bin



```
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
Expanding patches...
---- EXPANSION: 5 secs ----
Total pass fail0 fail1 refinepatch: 35372 14891 9237 11244 26135
Total pass fail0 fail1 refinepatch: 100 42.0983 26.1139 31.7879 73.8861
FilterOutside
mainbody:
Gain (ave/var): 1.96392 1.49849
41253 -> 40643 (98.5213%)       0 secs
Filter Exact: ***************************************************
40643 -> 35198 (86.6029%)       0 secs
FilterNeighbor: 35198 -> 31918 (90.6813%)       0 secs
FilterGroups:   20
31918 -> 30333 (95.0341%)       0 secs
STATUS: 1667 0 113052 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
---- Total: 0 secs ----
^C
                                     FM
ricky@RICKY:~$ cd openMVS_build/bin
ricky@RICKY:~/openMVS_build/bin$ 
```

8. ./InterfaceVisualSFM -i path_to_nvm_file/xxx.nvm -o path_to_mvs_file/xxx.mvs

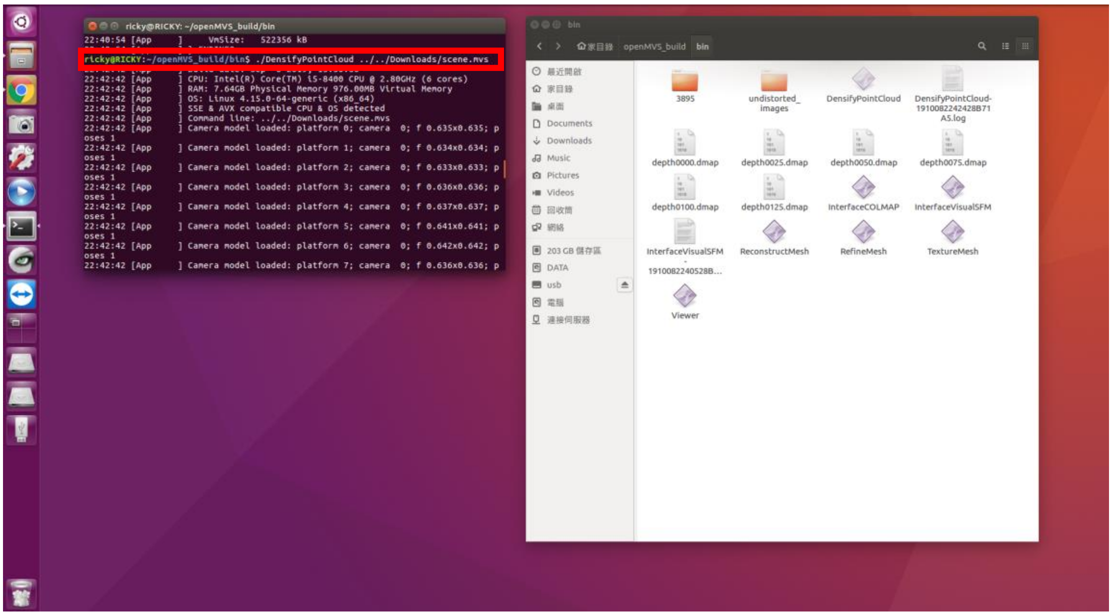
(-i means “input”, and -o means “output”)



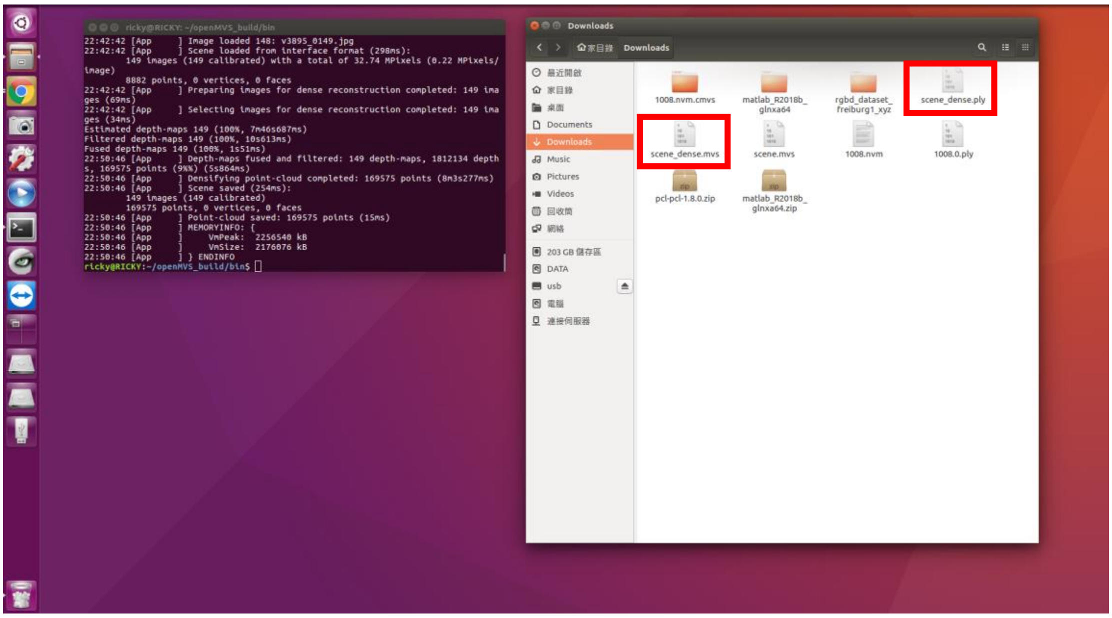
```
ricky@RICKY: ~/openMVS_build/bin
[1]+  Done                    VisualSFM
icky@RICKY:~/openMVS_build/bin$ ./InterfaceVisualSFM -i ../../Downloads/1008.nv
 -o ../../Downloads/scene.mvs
22:40:52 [App     ] CPU: Intel(R) Core(TM) i5-8400 CPU @ 2.80GHz (6 cores)
22:40:52 [App     ] RAM: 7.64GB Physical Memory 976.00MB Virtual Memory
22:40:52 [App     ] OS: Linux 4.15.0-64-generic (x86_64)
22:40:52 [App     ] SSE & AVX compatible CPU & OS detected
22:40:52 [App     ] Command line: -i ../../Downloads/1008.nvm -o ../../Downloads
/scene.mvs
22:40:52 [App     ] Loading cameras/points: ../../Downloads/1008.nvm
22:40:52 [App     ] 149 cameras; 8882 3D points; 57633 projections
Processed images 149 (100%, 2s165ms)
22:40:54 [App     ] Input data imported: 149 cameras, 149 poses, 149 images, 888
2 vertices (2s235ms)
22:40:54 [App     ] Scene saved to interface format (2ms):
        149 images (149 calibrated)
        8882 points, 0 vertices, 0 faces
22:40:54 [App     ] MEMORYINFO: {
22:40:54 [App     ]     VmPeak:   850232 kB
22:40:54 [App     ]     VmSize:   522356 kB
22:40:54 [App     ] } ENDINFO
ricky@RICKY:~/openMVS_build/bin$
```

9. ./DensifyPointCloud path_to_mvs_file/xxx.mvs

(“xxx_dense.ply” and “xxx_dense.mvs” are generated and put under the same directory as “xxx.mvs” located)



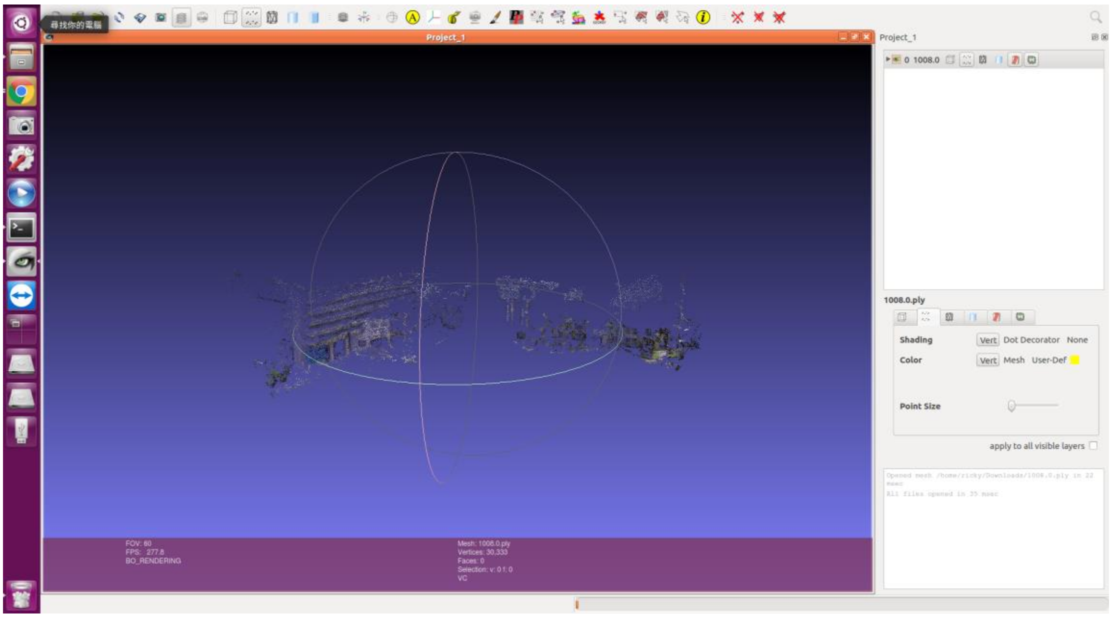
```
ricky@RICKY: ~/openMVS_build/bin
22:40:54 [App     ]      VmSize:   522356 kB
ricky@RICKY:~/openMVS_build/bin$ ./DensifyPointCloud ../../Downloads/scene.mvs
22:42:42 [App     ] CPU: Intel(R) Core(TM) i5-8400 CPU @ 2.80GHz (6 cores)
22:42:42 [App     ] RAM: 7.64GB Physical Memory 976.00MB Virtual Memory
22:42:42 [App     ] OS: Linux 4.15.0-64-generic (x86_64)
22:42:42 [App     ] SSE & AVX compatible CPU & OS detected
22:42:42 [App     ] Command line: ../../Downloads/scene.mvs
22:42:42 [App     ] Camera model loaded: platform 0; camera  0; f 0.635x0.635; p
oses 1
22:42:42 [App     ] Camera model loaded: platform 1; camera  0; f 0.634x0.634; p
oses 1
22:42:42 [App     ] Camera model loaded: platform 2; camera  0; f 0.633x0.633; p
oses 1
22:42:42 [App     ] Camera model loaded: platform 3; camera  0; f 0.636x0.636; p
oses 1
22:42:42 [App     ] Camera model loaded: platform 4; camera  0; f 0.637x0.637; p
oses 1
22:42:42 [App     ] Camera model loaded: platform 5; camera  0; f 0.641x0.641; p
oses 1
22:42:42 [App     ] Camera model loaded: platform 6; camera  0; f 0.642x0.642; p
oses 1
22:42:42 [App     ] Camera model loaded: platform 7; camera  0; f 0.636x0.636; p
```



```
ricky@RICKY: ~/openMVS_build/bin
22:42:42 [App     ] Image loaded 148: v3895_0149.jpg
22:42:42 [App     ] Scene loaded from interface format (298ms):
        149 images (149 calibrated) with a total of 32.74 MPixels (0.22 MPixels/
image)
        8882 points, 0 vertices, 0 faces
22:42:42 [App     ] Preparing images for dense reconstruction completed: 149 ima
ges (69ms)
22:42:42 [App     ] Selecting images for dense reconstruction completed: 149 ima
ges (34ms)
Estimated depth-maps 149 (100%, 7m46s687ms)
Filtered depth-maps 149 (100%, 10s613ms)
Fused depth-maps 149 (100%, 1s51ms)
22:50:46 [App     ] Depth-maps fused and filtered: 149 depth-maps, 1812134 depth
s, 169575 points (9%%) (5s864ms)
22:50:46 [App     ] Densifying point-cloud completed: 169575 points (8m3s277ms)
22:50:46 [App     ] Scene saved (254ms):
        149 images (149 calibrated)
        169575 points, 0 vertices, 0 faces
22:50:46 [App     ] Point-cloud saved: 169575 points (15ms)
22:50:46 [App     ] MEMORYINFO: {
22:50:46 [App     ]     VmPeak:  2256540 kB
22:50:46 [App     ]     VmSize:  2176076 kB
22:50:46 [App     ] } ENDINFO
ricky@RICKY:~/openMVS_build/bin$ 
```

Results

- ➢ original ply file (# vertex: 30333)



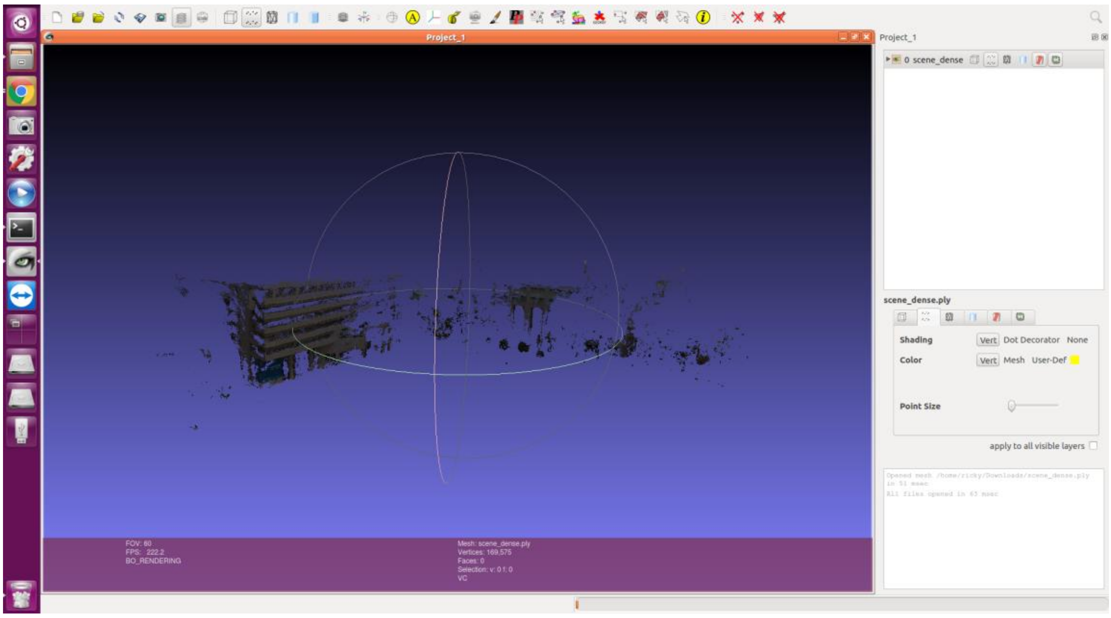
```
FOV: 60
FPS:  277.8
BO_RENDERING
```

```
Mesh: 1008.0.ply
Vertices: 30,333
Faces: 0
Selection: v: 0 f: 0
VC
```

Shading: Vert Dot Decorator None
Color: Vert Mesh User-Def
Point Size
apply to all visible layers □

```
Opened mesh /home/ricky/Downloads/1008.0.ply in 22 msec
All files opened in 35 msec
```

- ➢ densified ply file (# vertex: 169575)



```
FOV: 60
FPS:  222.2
BO_RENDERING
```

```
Mesh: scene_dense.ply
Vertices: 169,575
Faces: 0
Selection: v: 0 f: 0
VC
```

Shading: Vert Dot Decorator None
Color: Vert Mesh User-Def
Point Size
apply to all visible layers □

```
Opened mesh /home/ricky/Downloads/scene_dense.ply in 51 msec
All files opened in 63 msec
```