The PIL (Python Image Library) image processing library is the most commonly used image processing library in Python. The library provides basic image processing functions such as changing image resizing, format conversion, color field space conversion, image enhancement, histogram processing, generating QR codes, interpolation, and filtering. Before installing PIL, you need to install the dependency library: zlib, freetype, jpeg

NOTE:

1. **If the Raspberry Pi can connect to the Internet, it is recommended to download the latest driver or library for installation.**

2. **If the Raspberry Pi cannot connect to the Internet, install it directly using the driver or library provided in the sample directory.**

1. Log in to the Raspberry Pi terminal

2. Install the dependency library zlib

   A. Enter the following command to download the latest zlib library installation package.

      wget https://sourceforge.net/projects/libpng/files/zlib/1.2.8/zlib-1.2.8.tar.gz

      Or directly use the installation package provided by the sample directory.

   B. Enter the following command to extract, compile, and install:

      tar -zxvf zlib-1.2.8.tar.gz
      cd zlib-1.2.8
      ./configure --prefix=/usr/local
      make
      sudo make install

3. Install dependent library freetype

   A. Enter the following command to download the latest freetype library installation package.

wget

https://sourceforge.net/projects/freetype/files/freetype2/2.6.3/freetype-2.6.3.tar.gz

      Or directly use the installation package provided by the sample directory.

   B. Enter the following command to extract, compile, and install:

      tar -zxvf freetype-2.6.3.tar.gz
      cd freetype-2.6.3
      ./configure --prefix=/usr/local

make
sudo make install

4. Install dependent library jpeg

  A. Enter the following command to download the latest jpeg library installation package.

   wget http://www.ijg.org/files/jpegsrc.v8c.tar.gz

  Or directly use the installation package provided by the sample directory.

  B. Enter the following command to extract, compile, and install:

   tar -zxvf jpegsrc.v8c.tar.gz
   cd jpeg-8c
   ./configure --prefix=/usr/local
   make
   sudo make install

5. Install the dev link library

  A. Enter the following command to install the latest dev link library.

   sudo apt-get install zlib1g-dev libpng-dev libfreetype6-dev libjpeg8-dev

  B. or directly use the installation package provided in the sample directory, enter the following command to install:

   sudo dpkg -i –B zlib1g-dev_XXX_armhf.deb

   sudo dpkg -i –B libpng-dev_XXX_armhf.deb

   sudo dpkg -i –B libfreetype6-dev_XXX_armhf.deb

   sudo dpkg -i –B libjpeg8-dev_XXX_armhf.deb

   XXX is the version number of each dev installation package, and needs to be filled in according to the actual situation.

6. Install the PIL library

  A. Enter the following command to download the latest PIL library:

   wget wget http://effbot.org/downloads/Imaging-1.1.7.tar.gz

   Or directly copy the installation package in the "Demo_OLED_python_SPI"

   directory to the RaspberryPi system.

  B. Enter the following command to extract the installation package:

   tar -zxvf Imaging-1.1.7.tar.gz

  C. Enter the following command to modify the setup.py file.

cd Imaging-1.1.7
sudo nano setup.py

The changes are as follows:

```
# TIFF_ROOT = libinclude("/opt/tiff")

TCL_ROOT = None
JPEG_ROOT = "/usr/local/lib"
ZLIB_ROOT = "/usr/local/lib"
TIFF_ROOT = None
FREETYPE_ROOT = "/usr/local/lib"
LCMS_ROOT = None

# FIXME: add mechanism to explicitly *disable* the use of a library
```

After the modification is complete, press Ctrl+O, then press Enter, and finally press Ctrl+X to save and exit.

7. Enter the following command to check whether the system environment is successfully configured:

   python setup.py build_ext -i

   Displayed as follows:

```
pi@raspberrypi:~/Imaging-1.1.7 $ python setup.py build_ext -i
running build_ext
--------------------------------------------------------------------
PIL 1.1.7 SETUP SUMMARY
--------------------------------------------------------------------
version        1.1.7
platform       linux2 2.7.13 (default, Nov 24 2017, 17:33:09)
               [GCC 6.3.0 20170516]
--------------------------------------------------------------------
*** TKINTER support not available (Tcl/Tk 8.6 libraries needed)
--- JPEG support available
--- ZLIB (PNG/ZIP) support available
--- FREETYPE2 support available
*** LITTLECMS support not available
--------------------------------------------------------------------
To add a missing option, make sure you have the required
library, and set the corresponding ROOT variable in the
setup.py script.

To check the build, run the selftest.py script.
```

As long as the three items JPEG, ZLIB, and FREETYPE2 are available.

8. Enter the following command to compile and install the PIL library.

   sudo python setup.py build
   sufo python setup.py install