Building PocketSphinx on Android

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The following are the steps to install pocketsphinx application on Android. This Tutorial works only on Linux.
For Windows, please refer to the following link.

Before following these steps, make sure that you have the tools for developing android applications i.e. eclipse integrated with Android Development Kit and the Android-SDK tools.

To install Pocketsphinx :-
1). Download pocketsphinx and sphinxbase the latest version (0.8 is the latest version as of now).

Unzip the two files and place them inside the same parent folder and rename the folders by removing the version numbers.

2). Download swig

sudo apt-get install swig

Enter the password and swig will get installed.

3). Download Pocketsphinx Android Demo from the following link.

Unzip the PocketsphinxDemo file into the folder where you have placed sphinxbase and pocketsphinx folder.

Also download the following file from the link.

This is another(second) version of Pocketsphinx Android Demo but we will only need some files from this project. Copy the following files from /jni/edu/cmu/pocketsphinx/ of the second version to the PocketSphinxDemo/jni/edu/cmu/pocketsphinx folder of the first version of Pocketsphinx Demo download.

1). Config.java
2). Decoder.java
3). Hypothesis.java
4). pocketsphinx.java
5). pocketsphinxJNI.java
6). SegmentIterator.java

4). Download and install the Android NDK from the google developers website.
Know the path to your NDK, i.e the absolute path to where the NDK is present.

5). Open the terminal and cd into the folder where pocketsphinx and sphinxbase folder are present. Now cd into sphinxbase and do the following:

```
./configure
sudo make
sudo make install
```

Similarly, now cd into pocketsphinx folder and do the same.

```
./configure
sudo make
sudo make install
```

6). Now cd into PocketsphinxDemo/jni folder and open the Android.mk make file.

In line 5 of the file, change the variable **SPHINX_PATH** to the absolute path of the parent folder containing sphinxbase and pocketsphinx.

And in line 163, change

'LOCAL_STATIC_LIBRARIES := sphinxutil sphinxfe sphinxfeat sphinxlm pocketsphinx'

to

'LOCAL_STATIC_LIBRARIES := pocketsphinx sphinxlm sphinxfeat sphinxfe sphinxutil'

After this, Do the ndk build. From the terminal type

the-path-to-your-ndk-folder/ndk-build -B

Of course, substitute the real path to your ndk folder for the-path-to-your-ndk-folder, which you found out in step 4.

Note: When doing the ndk build, the present working directory must be the one containing the Android.mk file, i.e. PocketsphinxDemo/jni folder.

7). Now open Eclipse and import the PocketSphinxDemo.

In the Navigator View look for PocketSphinxDemo project. Right click on it and select properties. The properties screen will pop up and you will need to select Builders. In the Builders screen you will see SWIG and NDK build.
Click on NDK build and edit.

i). In the edit screen change the field Location to point to your ndk-folder you have on your machine.
ii). Click on the Refresh tab and select “The project containing the selected resource”
iii). Click on the Build Options tab and deselect “Specify working set of relevant resources”
Apply changes and exit the configuration for NDK build.

Click on SWIG and edit.

i). You will not need to change the Location since downloaded swig at the start of the

tutorial.
ii). In the refresh tab select “The folder containing the selected resource”
iii). In the Build Options tab deselect “Specifiy working set of relevant resources”
Apply changes and exit the configuration for SWIG.

And now you might get lot of error messages. Right click the PocketsphinxDemo project and click on properties.

i). Go to Java Build Path and add the system libraries (somehow they were not included in the project).
ii). After this go to click on Android under properties and select any one of the android API library. I strongly recommend to select API for 3.1 as there were few problems with the higher libraries.

All the errors that were present will vanish leaving behind a few warnings which can be ignored.

8). Now connect your Android device to the computer and make sure that USB Debugging is ON in your device.

Open terminal and cd into android-sdk/platform-tools folder and do the following.

Type **./adb shell**. A new shell will open whose present working directory is Android file system. (Works only if device is connected)

Then type

mkdir /mnt/sdcard/edu.cmu.pocketsphinx

If you get a permission denied error, gain root acsess by using the command '**sudo**' (No password will be needed).

If the error still persist, then refer to this link.

Reboot your phone if necessary.

After this, create two directories under edu.cmu.pocketsphinx, namely

1). **hmm**
2). **lm**

Under both these directories, create the directory '**en_US**'.

Under **/hmm/en_US** create a directory by the name '**hub4wsj_sc_8k**'.

Exit the adb shell.

Type the following commands

1) **./adb push (Path to parent folder containing sphinxbase and pocketsphinx)/pocketsphinx/model/hmm/en_US/hub4wsj_sc_8k /mnt/sdcard/edu.cmu.pocketsphinx/hmm/en_US/hub4wsj_sc_8k**

2) **./adb push (Path to parent folder containing sphinxbase and pocketsphinx)/pocketsphinx/model/lm/en_US /mnt/sdcard/edu.cmu.pocketsphinx/lm/en_US**

9). Now, in ecplise, open the RecognizerTask.java found in

/src/edu/cmu/pocketsphinx/demo

There are declared paths to a structure that is not valid on a 2.2 or above phone. We will need to change the paths so that they work correctly.

```
pocketsphinx.setLogfile("/mnt/sdcard/edu.cmu.pocketsphinx/pocketsphinx.log");
Config c = new Config();

/*
* In 2.2 and above we can use getExternalFilesDir() or whatever it's called
*/
c.setString("-hmm",
"/mnt/sdcard/edu.cmu.pocketsphinx/hmm/en_US/hub4wsj_sc_8k");

c.setString("-dict", "/mnt/sdcard/edu.cmu.pocketsphinx/lm/en_US/hub4.5000.dic");

c.setString("-lm", "/mnt/sdcard/edu.cmu.pocketsphinx/lm/en_US/hub4.5000.DMP");

c.setString("-rawlogdir", "/mnt/sdcard/edu.cmu.pocketsphinx"); // Only use it to
store the audio.
```

10). And now the final step, build and run the project. The application will the installed on the android device and test it.

The application should run fine if all the above steps are followed and executed correctly. If any errors when running the application, then view the log file in eclipse and find what the error is and rectify if possible or search online for solutions.

References:

1). http://cmusphinx.sourceforge.net/2011/05/building-pocketsphinx-on-android/

2). http://cmusphinx.sourceforge.net/2011/05/building-pocketsphinx-on-android/comment-page-1/ (For debugging errors).

3). http://swathiep.blogspot.in/2011/02/offline-speech-recognition-with.html

4). http://sourceforge.net/mailarchive/forum.php?forum_name=cmusphinx-devel (For debugging errors).

5). And for all others queries, there is Google.