WaveToSpeexPack
User Guide

Version: 1.2
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Content

History:

Ver.	Date	Update
1.0	2020-11-19	First release by Cyberon Ming.
1.1	2020-11-20	Insert chapter 3.1 “Prepare audio file”.
1.2	2020-02-18	Update 1.2 CPU usage.

1. Speex

1.1. Introduction

Speex is a free open source audio codec (https://www.speex.org/). We support parts of its feature:

1. It compress audio data with 8 or 16 KHz, mono channel, 16 bits, un-compressed PCM format.
2. For 8 KHz audio, the supported compression bit rate is 4000, 6000, 8000, 11200 and 15200 bps. 8000 bits per second is recommended.
3. For 16 KHz audio, the supported compression bit rate is 8000, 10000, 12800, 16800, 20800 and 24000 bps. 12800 or 16800 bits per second is recommended.

PS. We don’t support 32 KHz or stereo audio, and don’t support variable bit rate.

1.2. Specification

1. Code & table: 65 K
2. RAM: 3 KB heap and 6 KB stack per decode or encode stream.
3. The CPU usage is depend on sampling rate and bit rate, we list three case:

Sampling rate	8 KHz	16 KHz	
Bit rate	8000 bps	12800 bps	16800 bps
Encode	37.1 MCPS	62.22 MCPS	52.5 MCPS
Decode	5.52 MCPS	12.24 MCPS	11.82 MCPS

PS. Test on RA6M1 CM4 120 MHz.

2. WaveToSpeexPack

2.1. Introduction

WaveToSpeexPack is a Windows software tool, it has following feature:

1. It compress wave files by Speex audio codec to one pack file.
2. The wave file must be 8 or 16 KHz, mono channel, 16 bits, uncompressed PCM format. To convert other audio format to this wave format, please refer to 3.1 and 3.2.
3. It load wave files by read a script file. Please refer to 3.3 for the format of script file.
4. It has test page, we can test Speex pack file on PC.

2.2. Specification

1. Windows 10. It should be OK on Windows 7, but not tested.
2. Intel Pentium or i3.
3. 4 GB RAM.
4. 10 MB disk.

3. Preparations

3.1. Prepare audio file

We should prepare audio file before we compress it. The audio file may be got from:

1. Download music file from website, like a MP3 file.
2. Record from iPhone, like a M4A file.
3. Record from PC, like a WAV file.
4. Download from Text to Speech(TTS) website which support free or paid service.
   The TTS website:
   http://www.fromtexttospeech.com/
   Free to use and download MP3 file, but only support 8 languages.

   https://www.text2speech.org/
   Free to use and download MP3 file, but only support English and Indian.

   https://ttsmp3.com/
   28 languages, 62 voices. It cost US$5.25($103.95) to get 100K(1 M) characters conversion but only valid for one day(one year).

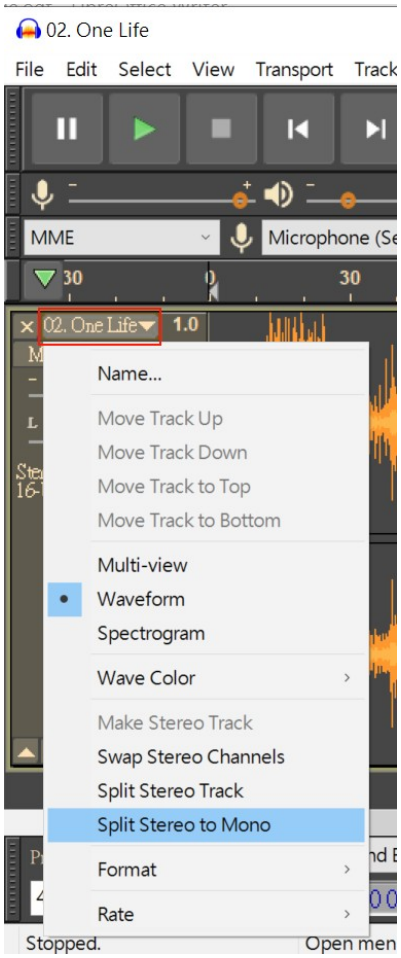
   https://www.ispeech.org/create.text.to.speech.audio/
   27 languages. Free to try, paid $100 for 900 words.

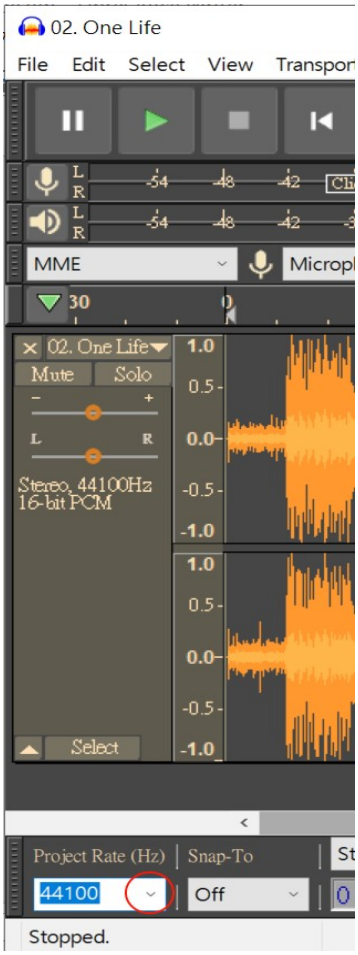
3.2. Convert audio file to WAV file by Audacity

If the audio source file is not fit for our requirement, we may use the free audio editor Audacity (https://www.audacityteam.org/) to convert it. For example, we convert a mp3 file:

1. Open MP3 file.
2. Mix stereo channel to mono channel:
   "Tracks" menu => Mix => Mix Stereo Down to Mono
3. If you don't like to merge channels' audio, you can choice the one of channel by:
   Track drop down menu => Split Stereo to Mono => Appear two tracks => Click the "X" at the upper left corner to remove the channel.
4. Change sampling rate to 8000 or 16000Hz:
   "Project Rate" change to 8000 or 16000.
5. Save as wave file:

"File" menu => Export => Export as wav





To support mp4, wma and m4a file(used by iOS), please refer to:
https://manual.audacityteam.org/man/installing_ffmpeg_for_windows.html

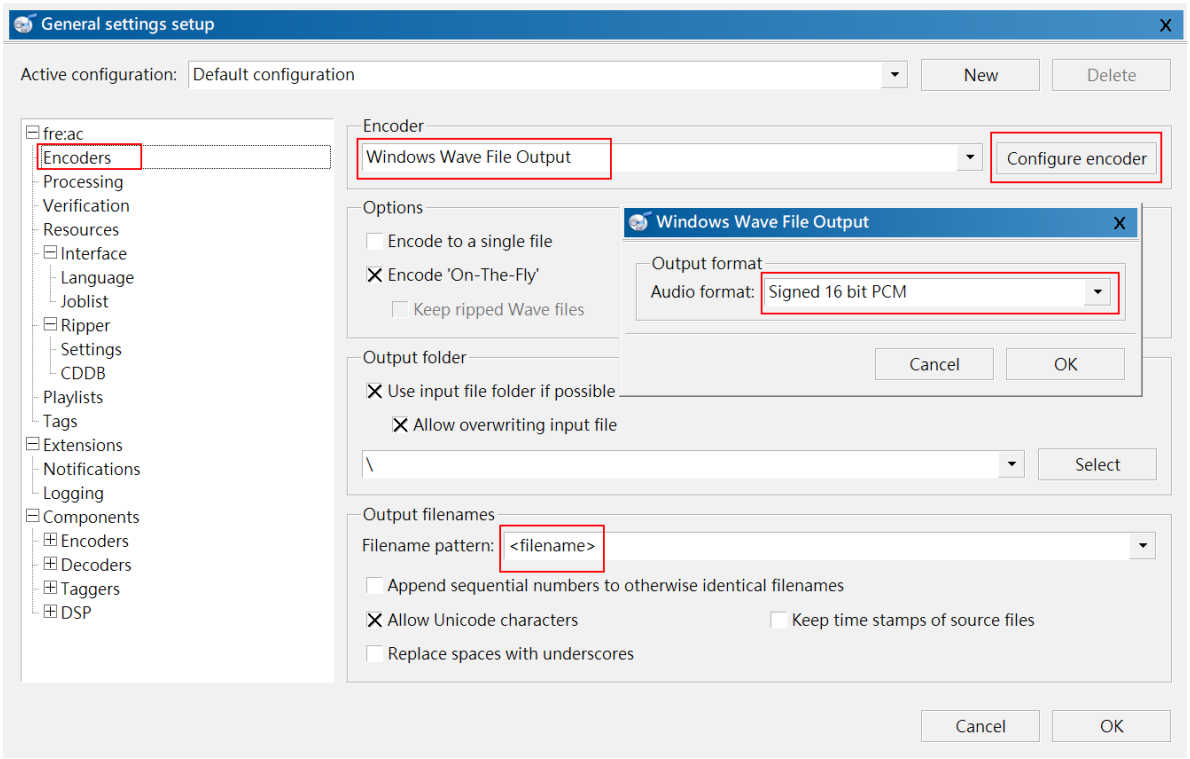
1. Close Audicity.
2. Install “FFmpeg for Windows”.
3. Open Audicity.

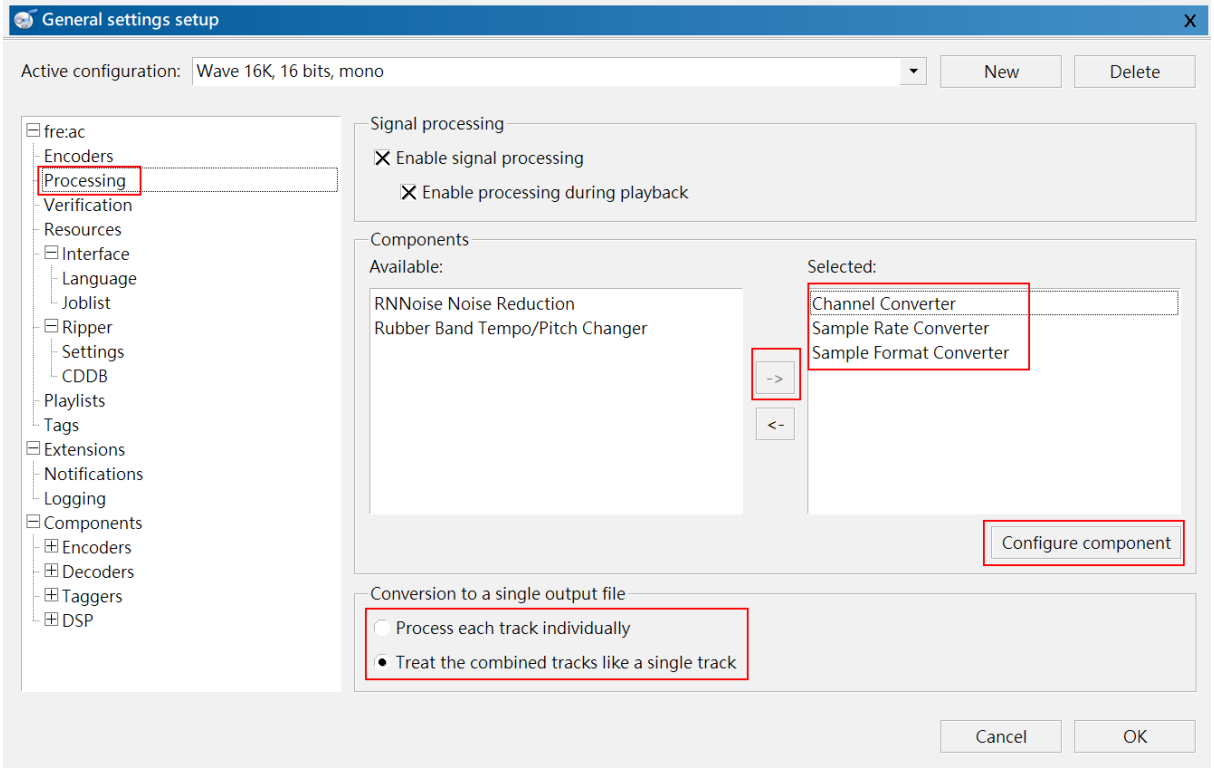
3.3. Convert audio file to WAV file by fre:ac

If there are a lot of audio files and no need to edit(cut...), fre:ac (https://www.freac.org/) is a good tool. It support Windows, mac OS and Linux platform.

1. Add audio files to job list:
   “File” menu => Add => Audio file(s)
   You can also drag audio files to Joblist.

2. Open settings dialog:
   “Options” menu => General settings
3. Set output to WAV file and the sample format:
   At left side of general settings dialog, select fre:ac => Encoders
   Click the “Encoder” combo list, select “Windows Wave File Output”
   Click the “Configure encoder” button, select “Signed 16 bit PCM”
   Set output folder.
   Set filename pattern, we prefer to select “<filename>”.
4. Set sampling rate, mono channel:
   At left side of general settings dialog, select fre:ac => Process
   In “Components” list, select “Channel Converter”, “Sample Rate Converter” and “Sample Format Converter”.
   “Sample Rate Converter” => “Configure component” => Converter select “Best Sinc Interpolation”, Output sampling rate select “16000”
   “Sample Format Converter” => “Configure component” => Select “Integer”, “16” bit
   “Channel Converter” => “Configure component” => Select “Mono”
   Select the first channel or mix channel data.
5. Start process:
   “Encode” menu => Start encoding





3.4. Prepare script file

The script file shall be UTF16 little endian encoding, and describe every wave file by one line. Every line has three strings and separate by TAB:

1. The wave file name with full path, or the related path(to the script file).
2. The map ID, it should be consistent with DSMT project.
3. The compression bit rate in bits per second.

Please refer to the script sample file: .\DemoWaves\DemoWaves16K_ENG.spt.

4. Convert Wave Files to Speex Pack File

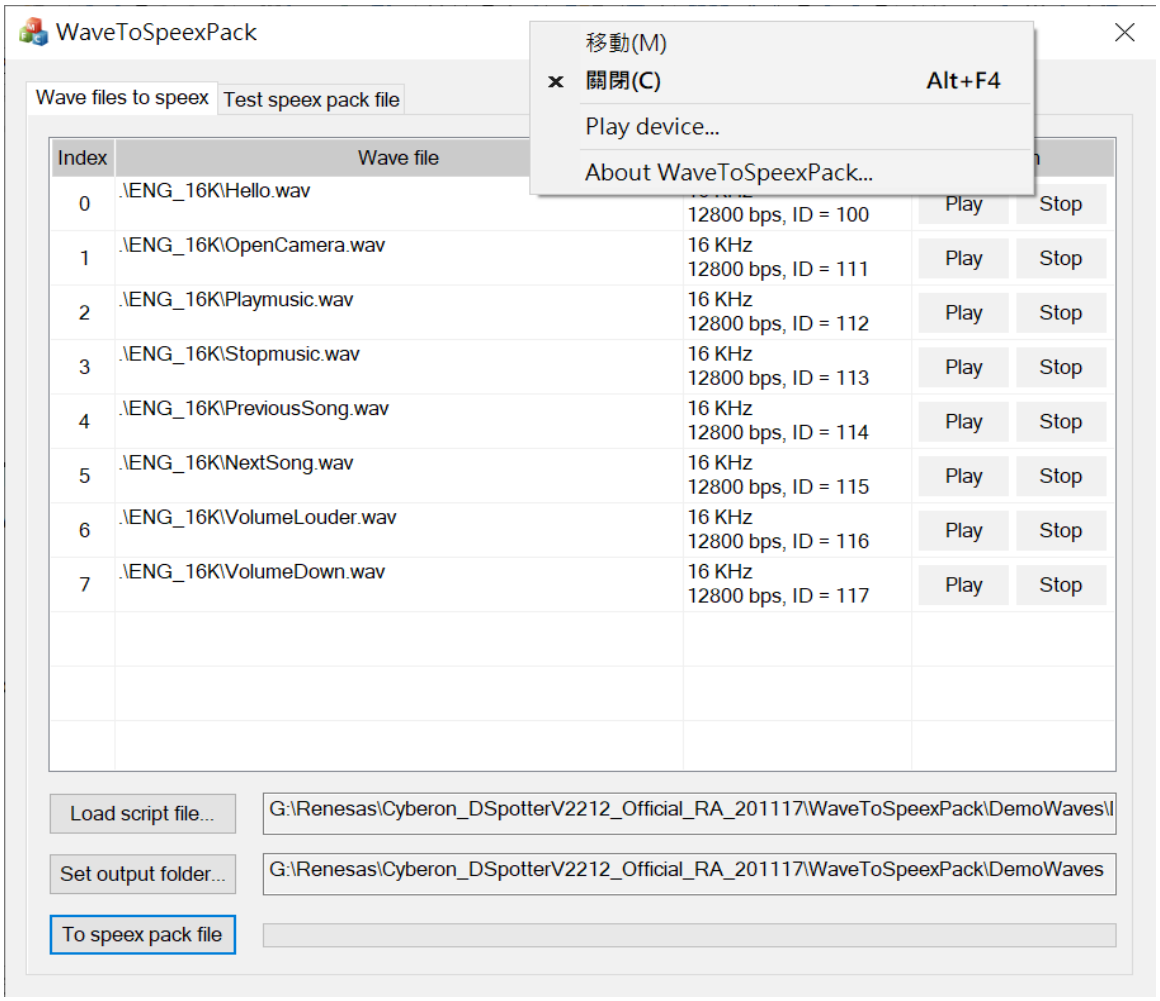
4.1. Convert

At first page “Wave files to speex”:

1. Click “Load script file…” to select the script file.
   To check the quality of audio source file, please click the “Play” button.
2. The output folder will change to the folder of script file. Please click “Set output folder…” to change it.
3. Click “To speex pack file” to generate Speex pack file.

PS.

1. If the content of script file is changed, please re-load this file to refresh this page.
2. The default playback device is same as the setting of Windows. To change the play device, please right click on the title bar and select “Play device...”.



4.2. Test

At second page “Test speex pack file”:

1. Click “Speex pack file…” button to select the Speex pack file(*.spxpack).
2. To check the compression quality, please click the “Play” button.

PS. If the Speex pack file is changed, please re-open this file to refresh this page.