Documentation for the Vocoder

July 2020

1 Using the .exe

1.1 config file

Before starting the .exe make sure that there is a configuration file which should contain the following lines as follows:

`FILTERLOCATION = C:\path\to\filterfolder`

specifies where the files for the filters are

`COMMANDINPUT=CMD|OSC`

specifies where the application expects inputs either on console (CMD) or via OSC-Commands(OSC)

`ADRESS=127.0.0.1`

`PORT=7000`

the adress and port for the OSC-Commands

`DELAYBETWEENCOMMANDS=100`

How long should be waited after an input until the next command is accepted (applies only to Console)

`MAXNUMOFBANDPASSBANDS=AUTO`

How many Bandpassbands will be used, if the application should determine itself how many there should be depending on the filterfiles use AUTO, otherwise a number

`ACTIVESTATE=ACTIVE`

In which state the application should start, either ACTIVE or STANDBY

`PROCESSINGSTATE=BYPASS`

if the application should start in BYPASS or PROCESSING

`INPUTSOURCE=FILEINPUT`

the initial input for the application either FILEINPUT or MICROPHONE

`CARRIER=SINE`

the initial carrier either SINE or NOISE

`ASIODRIVER=DRIVER`

specifies the driver

`BUFFERSIZE=64`

specifies the buffer size

`INPUTCHANNEL=1`

specifies the input channel (only one)

`OUTPUTCHANNEL=12`
specifies the output channel in this case 1 and 2 Additionally if you want to load files right from the start:
`FILENAME=filepath>Volume`
if you want to comment things use # and if you have whitespaces in the paths use $

1.2 filterfiles

The filterfiles for the bandpassfilters have to be named like this: `Filterbank_1.txt` and should be generated via the MATLAB-code. The file itself should contain the following (example filterbank for 2 filters):

```
Filter in this bank:  2
CENTERFREQUENCIES:
500.00
3180.1
/---------/
Filterband:1
Numerator Length:  2
0.0
-0.5
Denominator Length:2
1.0
0.5
/---------/
Filterband:2
Numerator Length:  2
0.0
-0.5
Denominator Length:2
1.0
0.5
```

The filterfile for the lowpass should be named `lowpass_for_envelope.txt` and look like this:

```
Numerator Length:  2
0.0004
-0.0004
Denominator Length:  2
1.00
-2.980
```

finally the file for the filterweights is named `filterweights.txt` and should look like this:

```
Filterweights
```

```
FilterBank1:
1
FilterBank2:
1
0.5
```

all files regarding the files should be created with the MATLAB-Code but allow for individual tweaking if necessary.

1.3 starting the .exe

The .exe can be started with `.\Vocoder.exe -d configfile.txt` both arguments are not necessary but allow for flexible use without recompiling to specify the configfile.
If the driver cannot be loaded a prompt on the console will be shown to choose one of the available ASIO-drivers (only the first 5 are shown). If the application shutsdown after the driver is loaded, the filterfiles were not found!
if the console states `ready` the application is ready to receive commands, And if using OSC and the application shuts down after stating ready the port or address is not supported!
`Shutdown` Shuts down the application
`State Active|Standby` Sets the vocoder into standby- or activemode
`LoadIntoApp <string filename>` loads the given file, takes some time
`LoadForPlay <string filename>` prepares the given file to be played, if already playing this file will be played
`Play Start|Stop|Pause` plays/stops/pauses/unpauses the current file
`Volume <float volume>` sets the outputvolume
`Vocoder On|Off` turns the vocoder on(processing) or off(bypass)
`Input File|Microphone` sets the input for the vocoder
`Carrier Sine|Noise` sets the carrier for the vocoder to sinewave, noise
`Postfiltering On|Off` turns postfiltering on or off
`Channelamount <int channels>` sets the amount of channels for the vocoder (turns off the postfiltering)
the commands are the same for OSC or Console.
Statemachines:

Figure 1: statemachine of the application

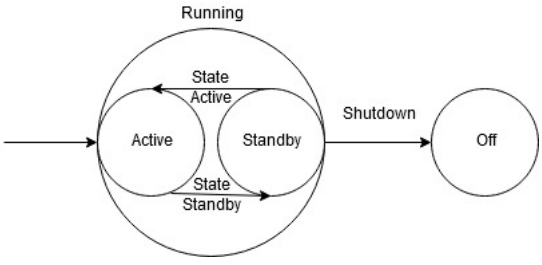


Figure 2: statemachine of the fileplayer

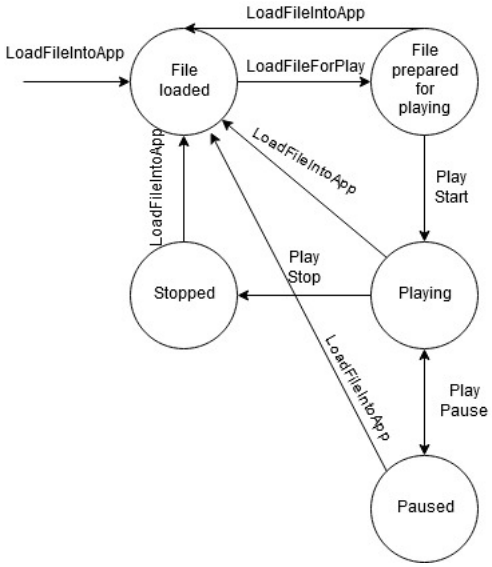
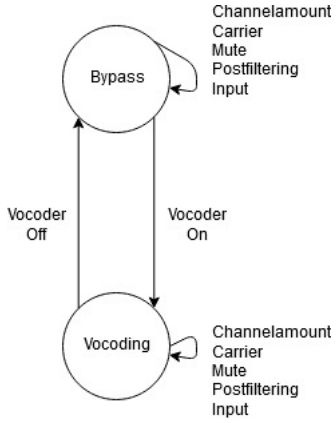


Figure 3: statemachine of the vocoding routine



2 tweaking the code

2.1 MATLAB-Code

The Matlab-file `filterbanddesignerV2.m` is responsible for creating the all the filterrelated files. Changing the fileformat, requires rewrites the readfunctions in the C++ Code.

2.1.1 Communication via OSC

a short example for the OSC-Communication is in `testosc.m`

2.2 C++ Code

If changes need to be made to the format of the configfile or similar, change `ConfigFileParser.h`
If changes need to be made to the format of the filterfiles or similar, change `fcfFileReader.h`
If changes need to be made to the Commands or similar, change `CommandListener.h`
If changes need to be made to the ASIO related things, change `ASIOInterface.h` and `ASIOFunctions.h`. If changes need to be made to the Vocoding functions, change `ProcessingFunctions.h` there are two versions of the vocoding routine, one accurate which filters continously noise or silence, and another one which is faster and filters only if the values are actually used. The difference is not noticable since the output gets muted when changing Channels or Inputs, to protect the listener from nasty sounds, clicks etc.