Vulpus Labs

Glow Up

Introduction

Glow Up is a spectral shaping module which detects prominent frequencies in its input signal, and boosts the first, second and third harmonics above those frequencies by a user-controllable amount. The effect is a little like an octave-up pedal, except that everything is done through spectral shaping.

This module introduces some latency into processing, as a consequence of the Fast Fourier Transform algorithm used to separate out frequency bands. The amount of latency is user-adjustable, and an LED indicator shows when more latency is needed to prevent audio glitches.

Theory of Operation

Glow Up divides an input signal into a range of frequency bands by splitting it into a series of overlapping processing windows, then performing a Fast Fourier Transform on each window. Three “quality” settings are available, corresponding to windows of 512 (low quality), 1024 (medium quality) and 2048 (high quality) samples respectively.

Glow Up detects prominent frequencies (i.e. those with higher than average energy) and boosts the frequencies in the bands at the first, second and third harmonics above those frequencies. For many kinds of input this will emphasise higher harmonic tones, producing an effect a bit like an octave-up pedal. The first harmonic is an octave above the fundamental frequency; the second is at (approximately) an octave and a fifth up, and the third is at two octaves up. The user can control how much each of these harmonics is boosted.

Once the spectrum of the input signal has been reshaped by these frequency boosts, the frequency bands are recombined to produce an output window, which is written into an output buffer. The output of the module reads from this buffer a number of samples behind where the processed windows are written, to leave time for complete input windows to be captured and processed. If input capture and processing takes too long, and the “read head” of the output buffer catches up with the “write head”, then a warning light is shown. The user can react by increasing the amount of latency added to the output signal.

Controls

Connect an input to the **IN** jack at the top of the module, and an output to the **OUT** jack at the bottom.

The **QUALITY** switch sets the size in samples of the windows sent to the FFT algorithm for processing into frequency bands: either 512 samples (left position, low quality), 1024 samples (middle position, medium quality) or 2048 samples (right position, high quality). Higher quality is better for signals with more complex harmonic information, like polyphonic synths or guitars playing chords rather than single notes, but has a higher processing latency.

The **+12**, **+19** and **+24** knobs control the amount of boost added to the first, second and third harmonics of each fundamental frequency detected in the signal

The indicator LED next to the **OUT** jack will flash red if samples are read from the output buffer before a complete output window has been written into it (this will usually result in audio glitching). To remedy this, double-click on the LED and select a larger latency amount, giving the module time to complete processing before samples are sent to the output jack.

Credits and Acknowledgements

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