Spectral Sculptor: Audio Morphing Plugin:

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Introduction:

The Spectral Sculptor is a real-time audio plugin designed to dynamically manipulate the spectral content of sound, enabling seamless morphing between two user-defined sources. This unique tool empowers musicians, sound designers, and audio enthusiasts to explore a vast sonic palette by blending the essences of different sounds.

Functionality:

Step 1: Users can load two audio samples serving as the morphing endpoints. Supported formats will include common lossless and lossy codecs (e.g., WAV, AIFF, MP3).

Step 2: Short-Time Fourier Transform (STFT) will be employed to decompose each sample into its constituent frequency components (magnitude and phase). This analysis will be performed in real-time for continuous processing.

Step 3: A set of sliders will allow precise control over the blending of specific frequency bands between the two source sounds.

Step 4: Grain Size Adjustment will provide control over the "graininess" of the morphed sound, allowing for smooth transitions or textured, glitchy effects. Techniques like windowing or granular synthesis will be explored for implementation.

Step 5: The morphed audio signal will be synthesized using Inverse Fast Fourier Transform (IFFT) and made available for further processing or recording.

Implementation:

Framework: The plugin will be developed using a cross-platform framework like JUCE (C++)

User Interface: A user-friendly interface will be designed to provide intuitive control over all morphing parameters. Visualizations may be included to aid in understanding the spectral composition of the sound.

Real-Time Processing: Efficient algorithms and optimization techniques will be employed to ensure smooth and low-latency audio processing in real-time.