**Tracy's Amplitude Depth 3D Plot for MP3 Player: User Manual**

Welcome to Tracy's Amplitude Depth 3D Plot for MP3 Player, a dynamic tool for visualizing and manipulating the frequency spectrum of your audio files in a 3D environment. This software allows you to load MP3, WAV, or OGG files, visualize their frequency amplitudes in a 3D plot, and control specific frequency ranges through muting or highlighting options. Below is a friendly guide to help you get started and make the most of this tool.

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**System Requirements**

* Web Browser: A modern browser with Web Audio API and WebGL support (e.g., Google Chrome, Firefox, Safari, Edge).
* Internet Connection: Required initially to load external libraries (Three.js and OrbitControls).
* Audio Files: MP3, WAV, or OGG files for analysis.
* Device: A computer or tablet with a decent graphics processor for smooth 3D rendering.

**Getting Started**

1. Open the Software:
   * Load the HTML file in a compatible web browser by opening it directly or hosting it on a local or remote server.
   * Ensure your browser has JavaScript enabled and supports Web Audio API.
2. Interact to Enable Audio:
   * Some browsers require user interaction (e.g., a click or tap) to enable audio playback due to security restrictions. Click anywhere on the page or interact with the controls if prompted.
3. Prepare Your Audio File:
   * Have an MP3, WAV, or OGG file ready on your device for upload.

**Interface Overview**

The interface is divided into three main sections:

1. Sidebar (Left):
   * Contains the Frequency Control panel with checkboxes to mute or highlight specific frequency ranges.
   * Includes an Unselect All button to reset all frequency control settings.
2. Top Controls (Center):
   * Title: Displays "Amplitude Depth 3D Plot."
   * File Input: Allows you to upload an audio file.
   * Audio Player: Standard controls to play, pause, or adjust the volume of the loaded audio.
   * Toggle Rotation Button: Starts or stops the rotation of the 3D visualization.

Visualizer Container (Main Area):

* + Displays the 3D plot, showing frequency (x-axis, logarithmic), amplitude (y-axis), and depth/loudness (z-axis).
  + The plot updates in real-time as the audio plays, with points colored based on amplitude or highlighted frequency ranges.

**Using the Software**

Loading an Audio File

1. Click the Choose File button in the top controls section.
2. Select an MP3, WAV, or OGG file from your device.
3. Wait for the file to load. The audio player will update, and the file name will appear.
   * Note: If the file doesn’t load, ensure it’s a supported format and not corrupted.

**Playing Audio**

1. Once the file is loaded, use the audio player controls:
   * Play/Pause: Click the play button to start or pause playback.
   * Seek: Drag the progress bar to jump to a specific part of the track.
   * Volume: Adjust the volume slider as needed.
2. The 3D visualization will update in real-time as the audio plays, showing the frequency spectrum.

**Controlling the 3D Visualization**

* Rotate the View:
  + By default, the 3D plot rotates automatically for a dynamic view.
  + Click the Stop Rotation button to pause rotation. The button will change to Start Rotation and turn red.
  + Click again to resume rotation.
* Manual Navigation:
  + Use your mouse to interact with the 3D plot:
    - Rotate: Click and drag to rotate the view manually.
    - Zoom: Scroll up or down to zoom in or out.
    - Pan: Right-click and drag to pan the view (if supported by your device).
  + The plot includes labeled axes:
    - X-axis (Frequency): Logarithmic scale from 20Hz to 20kHz, labeled with markers (e.g., 20Hz, 1kHz, 20kHz).
    - Y-axis (Amplitude): Shows the intensity of frequencies, with "Loud" at the top and "Quiet" at the bottom.
    - Z-axis (Depth/Loudness): Represents loudness, with "Forward" indicating louder sounds.

**Frequency Control Options**

The Frequency Control panel in the sidebar allows you to mute or highlight specific frequency ranges. Each range has two options:

* Mute: Removes the selected frequency range from the audio output (affects what you hear).
* Highlight: Colors the selected frequency range in the 3D visualization (affects what you see).

Frequency Ranges and Controls

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Range | Frequency (Hz) | Mute Option | Highlight Option | Highlight Color |
| Low | 20–400 Hz | Mute Low 20-400hz | Highlight 20-400hz | Yellow |
| Mid Low | 400–800 Hz | Mute 400-800hz | Highlight 400-800hz | Bright Purple |
| Mid | 800–1500 Hz | Mute Mid 800-1500hz | Highlight 800-1500hz | Pink |
| Presence | 1500–5000 Hz | Mute Presence 1.5-5Khz | Highlight 1.5-5Khz | Bright Orange |
| Mid High | 5000–8000 Hz | Mute 5kHz-8kHz | Highlight 5kHz-8kHz | Bright Purple |
| High | 8000–12000 Hz | Mute High 8K-12Khz | Highlight 8K-12Khz | Bright Yellow |
| Air | 12000–20000 Hz | Mute Air 12K-20Khz | Highlight 12K-20Khz | Orange |

How to Use Frequency Controls

1. Check a Box:
   * Select the checkbox next to the desired mute or highlight option (e.g., "Mute Low 20-400hz" or "Highlight 1.5-5Khz").
   * You can select multiple options simultaneously.
2. Observe Changes:
   * Mute: The audio output will exclude the selected frequency range (e.g., muting "Low" removes bass frequencies).
   * Highlight: The corresponding frequency range will appear in the specified color in the 3D plot.
3. Reset Controls:
   * Click the Unselect All button to clear all checkboxes and reset the audio and visualization to their default states.

**Example Use Case**

* To focus on vocals (typically 800–5000 Hz):
  + Check Mute Low 20-400hz and Mute Air 12K-20Khz to remove bass and high-end shimmer.
  + Check Highlight 800-1500hz and Highlight 1.5-5Khz to visually emphasize the mid and presence ranges in pink and orange.

**Troubleshooting**

* No Audio Playback:
  + Interact with the page (click or tap) to enable the Web Audio API.
  + Ensure your audio file is in a supported format (MP3, WAV, OGG).
  + Check your device’s volume and audio output settings.
* 3D Plot Not Displaying:
  + Verify that your browser supports WebGL. Try updating your browser or switching to Chrome/Firefox.
  + Ensure an audio file is loaded and playing.
* File Won’t Load:
  + Confirm the file is not corrupted and is a valid audio format.
  + Try a different file or reload the page.
* Performance Issues:
  + Close other browser tabs or applications to free up resources.
  + Use a device with a capable graphics processor for smoother rendering.
* Error Messages:
  + If you see an alert (e.g., "Web Audio API not supported"), try a different browser.
  + For other errors, reload the page or check the browser’s console (F12 > Console) for details.

**Tips and Tricks**

* Experiment with Frequency Controls:
  + Try muting different ranges to isolate instruments (e.g., mute highs to focus on basslines).
  + Use highlights to visually analyze specific frequency bands without altering the audio.
* Optimize Visualization:
  + Pause rotation for a static view when analyzing specific frequencies.
  + Zoom in to inspect details or zoom out for a broader perspective.
* Test with Different Tracks:
  + Load songs with varied instrumentation (e.g., classical, electronic, rock) to see how the 3D plot changes.
* Save Bandwidth:
  + If hosting online, consider downloading the Three.js and OrbitControls libraries locally to reduce dependency on external CDNs.
* Learn Frequency Ranges:
  + Use the tool to train your ear by muting/highlighting ranges and listening to their impact (e.g., "Presence" for vocals, "Air" for cymbals).

Thank you for using Tracy's Amplitude Depth 3D Plot for MP3 Player! Have fun exploring the frequency spectrum of your favorite tracks in 3D. If you have feedback or need further assistance, feel free to reach out to the developer or community forums.

Happy visualizing!