**Motivation**

- Existing libraries may not be fully functional on all components.
- Modern web frameworks and web audio technologies have become powerful.
- But, we still lack extensive and cross-platform tools/libraries for music and audio analysis on the Web.

**Essentia**

Essentia is an open-source C++/Python library for audio signal processing, developed at the MTG-UPF and licensed under the Affero GPLv3.

**Applications**

- Web, mobile, IoT apps for music education, identification, analysis, etc.
- Creative applications for Creative Coding, Games, Graphics, New media, etc.
- Music technology and music analysis.
- Real-time audio processing.

**Getting Started**

- **HTML/JavaScript:**
  - Easy-installation
  - Easy-to-use
  - Easy-to-extend
  - Easy-to-deploy
  - Web standards compliance
  - Lightweight and lesser dependencies
- **Modularity & Extensibility:**
  - Easy-to-customize and build
  - Reproducibility across different platforms
- **Web standards compliance:**
  - ES6, HTML5, JSON, Fonts, etc.
  - Cross-platform compatibility
  - NPM, CDN, etc.

**Architecture**

- **Controller**, **Computes**, **Observers**
- **Easy-to-install**
- **Easy-to-use**
- **Easy-to-extend**
- **Easy-to-deploy**

**Initial Benchmarks**

- Silver execution times for a 5 seconds audio file.
- Performance improvements are shown for various algorithms.

**Future Work**

- Performance improvements.
- Pre-trained models for audio analysis and classification.
- Development of new audio reconstruction methods.

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**Features**

- **DSP Blocks**
- **Audio Features**
  - Spectral features
  - Rhythm and tempo
  - Tonality and melody
  - Loudness
  - Fingerprinting
- **Inference with TensorFlow models**
- **Design criteria**
  - C++ with Python bindings
  - Large-scale deployment
  - Real-time processing
  - Cross-platform support (Linux, MacOS, Win, iOS, Android, JS)

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**Examples**

- Demos for many MIR tasks.
- Interactive educational materials.
- Sound synthesis and analysis.

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**Web-friendly**

- **MIR JavaScript Library for both web browsers and Node.js apps.**
- **Essentia.js WebAssembly backend**
- **High-level JS API**
- **Add-on Plugins**
  - essentia.js-plot
  - essentia.js-extractor
  - Code generator

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**Essentia.js**

- **Design Choices and Functionalities**
  - DSP blocks
  - Audio features
  - Inference with TensorFlow models

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**Technical Overview**

- **Features of essentia.js**
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  - Extensive documentation and examples

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