

# MUMA: A MUSIC SEARCH ENGINE BASED ON CONTENT ANALYSIS

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## ABSTRACT

Existing music search engines are often limited to the textual modality (i.e., searching the textual metadata that are attached to music documents). We introduce here MUMA (<http://muma.labs.exalead.com>), a new search engine that relies both on textual metadata and signal processing metadata. MUMA allows the user to search for particular chords sequences, for specific moods, and to listen to automatically generated song summaries.

**Index Terms**— Music indexing, Content analysis

## 1. INTRODUCTION

Most existing music search engines only offer textual search. While textual search allows the user to find music that they already know, it can only haphazardly be used to discover new songs, artists, etc. We introduce here MUMA (Music Mashup), a web-based application which provides new ways to search for music by analyzing raw music content to extract high level content based metadata (summaries, moods, chords).

## 2. CONTENT-BASED SEARCH

### 2.1. Search by chord sequence

Each indexed song is processed using Telecom Paris Tech's chord extractor<sup>1</sup>, followed by a smoothing algorithm to clean the results. Each chord sequence is then indexed into a relative notation, allowing us to ignore transpositions.

MUMA provides a simple user interface to input a chord sequence to search for, as presented on Figure 1. Any transposition of the input sequence will also be found.

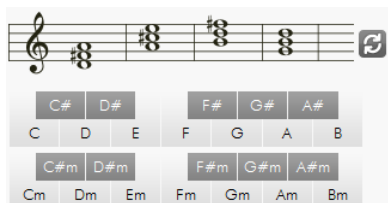


Figure 1 - Graphical User Interface for Chord Sequence Search

### 2.2. Searching by moods

IRCAM fuzzy mood classification system is applied to every song, associating with the song a 12-dimensional weighted mood vector, one dimension per mood. Global moods for albums and artists are calculated by computing the mean of individual song moods vectors. These calculations are indexed, allowing the user to search for songs, albums or artists that correspond to their own current mood.

### 2.3. Song characterization

Songs summaries are already used in online stores such as iTunes or Amazon. Unfortunately, chosen summaries may sometimes mischaracterize a song since they are often composed of a single 30 second segment from the beginning of the song. On the contrary, MUMA proposes intelligent summaries which are automatically produced using another IRCAM tool which detects the most characteristic segments in the song. These segments are then concatenated into a summary using fade-outs between segments. The resulting summaries are then labeled, allowing the user to understand the structure of the song (i.e., chorus, verse, bridge...).

## 3. INTERFACE

MUMA's simple user friendly interface is divided in 3 parts: the left part contains the search tools, the middle part presents search results and the right part shows further information about the selected artist (latest tweets, bio, coming concerts, photos, lyrics, etc.) The MUMA site was built using HTML5 and Ajax technologies.

## 4. EVOLUTION

MUMA<sup>2</sup> offers content-based search for songs through a user friendly interface. More search functionalities will be integrated shortly: automatic genre detection, similarity based on acoustic features, and extraction and display of the main melody. We also will allow the user to perform chord sequence search via a MIDI piano connected to the interface.

## 5. ACKNOWLEDGMENTS

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<sup>1</sup> L. Oudre, Y. Grenier, and C. Fevotte, "Chord recognition using measures of fit, chord templates and filtering methods," IEEE WASPAA, New York, 2009, pp. 9–12

<sup>2</sup> <http://muma.labs.exalead.com>