

MELODY INFORMATION RETRIEVAL SYSTEM

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Introduction

Music Retrieval is a field of rapidly growing commercial interest. Melody Information Retrieval System is used to search large collections of music, to retrieve a desired song by humming or singing a part of the song which the user may have lingering in his head for many days but doesn't know where he heard it or which song it is from.

There are several techniques proposed for retrieving songs based on singing or humming. Some of them are autocorrelation [1], UDS string matching technique [2], frame-based approach [3] and Dynamic Time Warping (DTW) technique [4, 5]. Among these DTW is considered to be more efficient for comparison and retrieval. Hence DTW technique has been implemented in this system.

The developed system allows the user to simply hum the tune into a computer microphone, and the system searches through a database of songs for melodies containing the tune and returns a ranked list of search results. The user can then find the desired song by listening to the results.

The main advantage is that a user can search for songs by humming the tune of the song, rather than by specifying their file names, which may be irrelevant to any of the song's details. The search is designed with some amount of tolerance to possible errors that may be introduced due to inexact query specification, pitch tracking errors, etc.

Objectives

To develop a system that,

- Accepts real-time inputs.
- Implements searching based on singing, humming.
- Finds correspondences in a collection of songs with the input tune without any specific instruction for style or articulation.
- Minimizes user errors and uses DTW (Dynamic Time Warping) technique efficiently for the retrieval of top matching songs.

Methodology

Melody Information Retrieval system is designed as a five-stage framework comprising of

➤ **Preprocessing (of input tune)**

The acoustic input which could be hummed sung or an audio segment is recorded from a PC microphone directly and converted to midi format.

➤ **Melody Processing (of reference directory)**

A certain number of songs are selected to form the reference directory. During melody processing, each song is converted to its midi format. Both wav and midi format of each song is stored in the same reference directory.

➤ **Pitch Extraction and Normalization**

The pitch vector is extracted from both the preprocessed input tune and the reference song. Normalization is used to minimize the pitch variances between the input and the reference song.

➤ **Matching Engine**

To the normalized pitch vectors obtained, Dynamic Time Warping (DTW) algorithm is used to compute the distance between them. The score is computed using DTW for each song in the database w. r. t the given input tune.

➤ **Rank list**

Songs with certain minimum scores form a *rank list* of matching melodies.

Results and conclusion

The system is tested with 50 inputs from 6 different users. The results are favourable and validation ws also done.

Scope for future work

- To the obtained rank list, applying more robust technique that retrieves single song which exactly matches the input query.
- To build a reliable and an efficient large-scale system that searches thousands of songs and responds in seconds.
- The search time can be reduced by using indexed files.
- To make the system capable of accepting other types of inputs such as whistling or tapping a part of a song.