

An efficient frequent melody indexing method to improve the performance of query-by-humming systems

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Abstract.

In recent years, the need to efficiently store and retrieve large amounts of musical information has increased. In this paper, we design and implement a Query-By-Humming (QBH) system, which can retrieve melodies similar to users' humming. To make this QBH system efficient, the following three methods were proposed. First, we convert the melodies to be indexed into the corresponding strings, in order to increase search speed. The conversion method is designed to tolerate the errors involved in humming. Second, we extract significant melodies from music and then build a couple of indexes from them. For this task, we propose reliable methods for extracting melodies that occur frequently and for melodies that begin after a long rest. Third, we propose a three-step index searching method for minimizing database access. Through the experiments with a real-world data set, it was verified that this system has noticeable improvements over the N-gram approach.

Keywords: content-based indexing method; multimedia database; music information retrieval; query-by-humming system

1. Introduction

As the use of multimedia information is becoming more common, users require new methods to retrieve multimedia information more easily and more quickly than the current methods. In order to satisfy these demands, many studies have been conducted. Currently, the most common approach for finding multimedia content is text-based retrieval. The text-based retrieval method finds multimedia content using keywords that are previously annotated. However, users cannot use the text-based method when they do not remember the keywords associated with desired multimedia content. Also, since the text-based method only searches for the multimedia content that exactly matches a user's query, it is not appropriate for similarity searching. In particular, the

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