

Using an N-gram-Based Mapping Approach to Content-Based Music Information Retrieval

CHUEH-CHIH LIU¹, TE-WEI CHIANG² and TIENWEI TSAI³

1 Library & Information Center, Chihlee Institute of Technology

2 Department of Accounting Information Systems, Chihlee Institute of Technology

3 Department of Information Management, Chihlee Institute of Technology

313, Sec. 1, Wunhua Rd., Banciao, Taipei County, Taiwan

ABSTRACT

Studies on query-by-humming (QBH) have recently become increasingly popular. On the basis of the fact that MP3 and MIDI formats have the advantages of small storage space and high audio quality, thereby making them suitable for Internet applications, we propose a novel approach based on QBH to retrieve information from MP3 and MIDI formats. In the database establishment phase, each music file is first partitioned into a set of musical data objects encoded via mapping function, including bi-gram, tri-gram and four-gram approaches, to establish a music database. In the retrieval phase, the file most similar to the musical test segment can be retrieved from the music database. Experiments were conducted to demonstrate the effectiveness of our approach.

Key Words: query-by-humming, content-based retrieval, music information retrieval, music databases

基於 N-gram 映射函數之內涵式音樂檢索法

劉爵至¹ 蔣德威² 蔡殿偉³

¹ 致理技術學院圖資中心

² 致理技術學院會計資訊系

³ 致理技術學院資訊管理系

台北縣板橋市文化路一段 313 號

摘要

近幾年來，哼唱式查詢的研究一直受到大家的矚目。事實上，MP3 和 MIDI 音樂格式都具有檔案小和音樂品質高的優點，目前在網際網路上被廣泛地使用。本論文中，我們提出了一個利用哼唱式查詢的方法去進行 MP3 和 MIDI 格式的音樂檢索。在音樂資料庫 (music database) 的建置階段，資料庫中的每首音樂會先經過斷句 (segmentation) 的處理，形成一段一段的樂句 (phases)，再透過映射函數 (mapping functions)，分別針對二個音符 (bi-gram)、三個音符 (tri-gram) 和四個音符 (four-gram) 進行編碼，作為檢索的依據。在樂句的檢索階段，和測試樂句最相似的音樂會從音樂資料庫中被檢索出來。我們進行了一系列的實驗，結果證明我們的方法有很好的成效。

關鍵詞：哼唱式查詢，內涵式檢索，音樂資訊檢索，音樂資料庫