

# A MUSIC RETRIEVAL SYSTEM WITH SPELLING CORRECTION TECHNIQUE

**Masafumi Suzuki**

Graduate School of Science and Engineering,  
Ritsumeikan University  
msuzuki@coms.ics.ritsumei.ac.jp

**Kyoji Kawagoe**

College of Information Science and Technology,  
Ritsumeikan University  
kawagoe@is.ritsumei.ac.jp

## ABSTRACT

In this paper, we describe a novel music information retrieval system using spelling correction technique. The current music retrieval systems with humming enable a user give a query with humming. However, there is a problem that a user cannot always input a complete melody to the system with humming. It is because the user often mistakes a melody in its query. In order to solve the problem, we employ the spelling correction technique, which is used usually in a document processing system. Our system first converts user's query by humming into melody information then in order to apply the spell correction, "term" and "characters" are extracted from the melody. Finally, our system can correct the mistake of the user's query by the spelling correction technique.

## 1. INTRODUCTION

When you use a search engine, it can check your mistakes in spelling. For example, you type "speling" to such a system. The system comes back instantaneously so with "Did you mean: spelling". As shown in the example, even if a user occasionally makes a mistake in the query input, the system can correct the user's mistake. Several music retrieval system using humming have been proposed and some of them are actually used [1]. However, the query correction function is not implemented on these system. In this paper, we propose a music retrieval system with humming using spelling correction technique.

## 2. A MUSIC RETRIEVAL SYSTEM WITH SPELLING CORRECTION TECHNIQUE

### 2.1 Motivation

The technology of the spelling correction is a well-known method [2]<sup>1</sup>. When you use a word processing software or a document retrieval system you are supported by this technique. We apply this technique in order to increase the quality of music retrieval systems with humming.

The spell correction technique can be described using the probability theory. When you find the correction  $w$  out

of all possible corrections, you only maximize the following probability of  $W$  given the original word  $Y$ :

$$\operatorname{argmax}_w P(W|Y) \quad (1)$$

By Bayes Theorem, this is equivalent to the following:

$$\operatorname{argmax}_w P(Y|W)P(W) \quad (2)$$

In the spelling correction technique,  $P(Y|W)$  corresponds to the levenshtein distance and  $P(W)$  corresponds to the occurrence count.

### 2.2 Model

The spelling correction technique for music retrievals can be realized in our system by applying the model of the document for melody information. In order to do so, we first split a humming melody and then apply the model of document by extracting "term" and "characters" in the melody. Several melody splitting methods exist [3]. Our system splits a melody by using sliding window method. This sliding window can correspond to the "term". Then, our system split each window into a sequence of melody elements by the n-gram method. This melody element split by n-gram method corresponds to the "character".

## 3. CONCLUSION

In this paper, a music retrieval system using spelling correction technique is proposed. Our proposed system is being developed and can be demonstrated to show the effectiveness of the use of the spelling correction technique in a music retrieval system with humming.

## 4. REFERENCES

- [1] N. KOSUGI. Soundcompass : A practical query-by-humming system-normalization of scalable and shiftable time-series data and effective subsequence generation. *Proc. ACM SIGMOD International Conference on Management of Data, 2004*, pages 881–886, 2004.
- [2] Christopher D. Manning, Prabhakar Raghavan, and Hinrich Schütze. *Introduction to Information Retrieval*. Cambridge University Press, July 2008.
- [3] Bin Cui, H. V. Jagadish, Beng Chin Ooi, and Kian-Lee Tan. Compacting music signatures for efficient music retrieval. In *EDBT '08: Proceedings of the 11th international conference on Extending database technology*, pages 229–240, New York, NY, USA, 2008. ACM.

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<sup>1</sup> <http://nlp.stanford.edu/IR-book/html/htmledition/spelling-correction-1.html>