

Distribution of Lecture Concepts and Relations in Digital Contents

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Abstract. Digital contents contains a large number of learning concepts most of which contribute to the main learning ideas. How to focus on the learning faults and improve the learning process is important. In this paper, we propose a novel approach to retrieving the main ideas from, as well as to constructing a domain tree to represent, the contents of materials. The nodes of the domain tree consist of meaningful texts. We collect the meaningful texts by segmenting words of the digital contents and then recombining these texts to form a binary number. We define a scoring method for the digital contents by assigning a sequence of 0's and 1's to the texts. These binary numbers can then be easily calculated by a function of sequence with power n and base 2, where $n \in N$. Each sequence can get a unit score which indicates the location in the context. An expression of digital contents represents a unit, a chapter, a section, or a paragraph. This expression can be provided as a feedback to teachers or students. Based on the feedback, teachers can make questions in the exam sheet more evenly distributed while students can improve the way they learn.

Keywords: Learning, Knowledge-based, Word Segmentation, Feedback.

1 Introduction

We bring up an idea to score the concepts of learning materials and to establish a domain tree to represent the concepts [1]. Each concept has a unique score to represent the location of the learning materials [2]. In the new century of knowledge economics, the key to touch the future is by e-learning. Digital learning can leap learning across space and hours. To provide personalization support is an important e-learning research called adaptive learning in the Learning Management System (LMS) [3], [4], [5]. Adaptive learning mentions that personal learning situation can be caught [6], [7]. One way to catch learner's situation is by testing. In LMS, the first step is to establish testing banks to support a great deal of testing. Teachers get the learning condition of learner's by means of the result of the testings in LMS [9], [10].

Most of the learning management systems only support online testing or exam. The score is the result. In terms of testing, learning management system catches students' testing and calculates scores, but not in terms of learning [11], [12], [13]. In this paper, we use elementary school, grade 4, second semester textbook for experiment. There are many publishers for grade 4 textbooks. We choose two popular editions to compare the difference. They are "KANG HSUAN Educational Publishing Group" [14] and "HAN LIN Educational Publishing Group" [15].

In the textbook, each chapter is divided into several sections, and each section consists of several paragraphs. Given a binary expression, a paragraph can be broken into a set of texts. We use "The CKIP (Chinese Knowledge and Information Processing) group" [16] to provide Chinese Texts. Besides, the CKIP helps us break up contents into text sets. We set a paragraph of contents into a binary sentence, i.e., the combination of 0's and 1's. Finally, two different binary sentences can unite together and become a larger binary set. A concept tree is built to represent a chapter [17], [18]. In the same way, we check the questions of exam and break up the sentence into a binary expression. A question can be classified to a paragraph of context [20], [21]. Afterwards, we can locate the wrong answer from the exam and help in learning.

There is a modern method Vector Space Model(VSM) for counting the ranks among all the documents [19], [8]. VSM uses the frequency of each term as a coordinate. Each document can be treated as a vector, even the questions. VSM can exactly calculate the relation ratio between any arbitrary documents, which is computation intensive. Our method has short cut from the terms to mark the location, because we only need to take the relations between questions and contents.

The remainder of the paper is organized as follows. Section 2 introduces the proposed method to construct a domain tree. The feedback from the domain tree to teachers and students is discussed in Section 3. Section 4 provides an instance of real learning material, and Section 5 concludes the paper.

2 Lecture Distribution

Testing by itself can not lead to good learning. Instead, it just lets you get acquainted with computers. On the other hand, testing system provided in the Learning Management System by itself will not be a complete system. We believe that digital learning will promote learning speed and enhance learning achievement. In fact, an item bank combined with testing system can certainly promote learning process. However, what is the difference between online testing and paper testing?

In general, the correct and effective learning will lead to a good score for learners. Extracting context of learning material is the first step. Academia Sinica [22] has developed a Chinese Texts System. With this environment and technology now well established, we are focusing on knowledge-based information processing. It is a web service. Sending the format data to the web service and then, the service return the set of terms.