ABSTRACT

Training students in the discernment ability is an important task in distance education. To improve the training results, this chapter makes the following contributions: (1) suggests Web courseware on controversial social issues with different viewpoints for discernment training; (2) constructs the courseware for Discernment Ability using a method called DRPA. This method is presented with five algorithms, for extracting representative phrases, calculating characteristic array, determining the threshold array, objective judgment and subjective judgment; (3) proposes and proves that a new concept, called Gymnastics Threshold, is more accurate than traditional threshold; and (4) uses extensive experiments to show that DRPA is much more efficient and accurate than traditional method.

Keywords: automatic document discrimination; discernment ability training; distance learning; natural language understanding

BACKGROUND AND PROJECT MOTIVATION

As an experiment of the distance-learning MSc and PhD degree programs, one of the authors is currently teaching, partially via the Internet, a course named “Reading Selected Articles on the Web” (RSAW) to students across several provinces in China. To improve the learning quality and the performance of the tutoring system, we have developed the Web Tutor Object Tree (WTO Tree) (Tang, Lau, Li, Yin, Li, & Kilis, 2000), a method to construct personalized courseware to adapt teaching according to the ability of individual students. The popularity of distance learning has prompted demands on Web courseware discrimination, as illustrated in the following examples:

Example 1. The International Debate Competition for University Students (IDCU) is being held annually in Asia and the Pacific region, as well as other areas of the world. The competing teams...
will draw cuts to determine their points of view (pro or con). After drawing cuts, the teams have 24 hours to prepare their debate. In order to use the Web resources, the coaches and teams are in urgent need of a tool to help discriminate Web courseware with different points of view on a specific topic.

Example 2. In a research area, different academic camps often hold different or opposed viewpoints; for example, the arguments on human rights in Africa, the debate on heredity and aberrance in biology, the arguments about the “goto” statement in programming languages, the controversy about universal schema in database area, and so forth. In order to train the discernment ability of distance-learning students, professors teaching the RSAW course need a tool to recognize and select Web documents in different viewpoints to organize the WTO Tree (Tang et al., 2000). Sometimes, a professor may prefer the students to read 60% of the papers in a particular point of view and 40% of papers in the other point of view.

The above examples show that the training student’s discernment ability is an important task for distance education. To enhance students’ discernment ability by distance education, we suggest Web courseware on controversial social issues with different viewpoints for discernment training. In order to construct good training courseware for this purpose and to check students’ exercises in discernment training, an automatic document discrimination method called DRPA is proposed, along with five algorithms in this chapter.

The rest of this chapter is organized as follows: The next section gives related works and deficiency of existing work. Then we discuss the limitation of traditional approaches for courseware discrimination and the special approach in this work. Afterward, we give preliminary concepts and notions of DRPA, and then present the algorithms for extracting representative phrases, calculating characteristic array and threshold array, objective discrimination and subjective discrimination. We show some experimental results of the proposed method in a classroom environment, demonstrating the efficiency of the algorithms. And finally, we briefly conclude the article.

RELATED WORK AND DEFICIENCY OF TRADITIONAL METHODS

Document discrimination can be viewed as a special case of text classification that is widely used in e-commerce, e-services, virtual offices and network security (e.g., discriminating black e-mails), and has been studied extensively, as many methods have been developed (Tang, Lau, Yin, Li, Lu, Yu, Xiang, & Zhang, 1999; Tang, Yu, You, Zhang, & Yang, 2000; Mannila, & Toivonen, 1999; Jiang, Tseng, & Tsai, 1999). Various research directions have been explored, such as K-nearest neighbor (kNN) algorithms, neural networks, decision trees (ID3) (Damerau, & Weiss, 1994), rule learning, support vector machine (SVM), linear classifiers and Naive Bayes methods. Some new methods have been studied in recent years for text classification (Tan, Li, Rynson, & Huang, 2003). Due to space limitations, the detailed analyses and comparison for the related works are omitted here. By the special feature, the general text classification methods are not efficient for Web documents discrimination. Most existing methods discriminate docu-
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