

for one or more items. In traditional auctions, an individual item is auctioned separately, which leads to an inefficient allocation and processing time. On the other hand, combinatorial auctions have been proposed to improve the efficiency of bid allocation by allowing bidders to negotiate on multiple items. Being commercially efficient, combinatorial auctions are getting more attention than traditional auctions. However, winner determination problem is still one of the main challenges of combinatorial auctions. Indeed, determining the winner(s) in combinatorial auctions is an extremely complex problem and has been shown to be NP-complete. We are interested particularly in combinatorial reverse auctions in which we consider the procurement of a single unit of multiple items. In this regard, we propose a new method based on genetic algorithms to address two important issues in the context of combinatorial reverse auctions: determining the winner(s) in a reasonable processing time, and reducing the procurement cost. In fact, not much work has been done using genetic algorithms to solve winner determination problem specifically for combinatorial reverse auctions. In order to evaluate the performance of our method, we conducted several experiments to compare our proposed method with a well-known technique for determining the winner(s) in combinatorial reverse auctions. The results of these experiments clearly demonstrate the superiority of our method in terms of processing time and procurement cost. We also performed some statistical measurements that reveal the consistency of the proposed method.

### **Towards Hybrid Collaborative Filtering Recommender System**

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Consumers have trouble choosing proper products or services with the increasing number of available products and services throughout the Internet. As a consequence, many studies have been done in recommender systems and many companies including Netflix and Amazon have provided recommender systems to provide better consumer satisfaction. Especially, recommender systems become more important in the movie, music and book industry since consumers want to share their experience with others after watching the same movies, listening to the same music, and reading the same books. Recommender systems are categorized into two different types: Content based filtering and Collaborative filtering. Content based filtering is based on the characteristics of users and products. The method characterizes each product based on attributes such as genre, actors, directors, or each user based on profiles using demographic information such as gender, age, and income levels. On the other hand, collaborative filtering is

based on the previous user rating data. The method assumes that the number of users is more than the number of products, and similar types of users will experience similar types of products. Especially, latent factor model represents users or products with a combination of hidden factors. Content based filtering is relatively easy to implement. The method can handle a new user or a new product since the algorithm depends on properties of user or product rather than previous user ratings. However, the method depends on a human to extract the features. Consequently, it shows a relatively poor performance compared to a collaborative filtering method. On the other hand, collaborative filtering algorithm shows better performance by using hidden latent factors in user ratings. However, it is expensive to build a collaborative filtering system, and has trouble rating a newly introduced product or user. Hybrid recommender system was proposed to overcome the limitations of both methods with a little bit of implementation overhead. In this study, we explore a framework of hybrid collaborative filtering recommender system considering product properties and user profiles. Our limited experimental results with movie data shows that hybrid recommender system shows better results by considering product properties and user profiles.

### **Does Chinese Political Leaders' Language Formality Decrease with Aging?**

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In comparison to informal texts, formal texts are assumed to have more abstract words, complex syntax, higher cohesion, and be in the expository rather than narrative. Using the linguistic and psychological features at the word level and cohesion to measure formality, this paper aims to investigate whether the Chinese political leaders' formality declines throughout the lifespan in a case study. The corpora are a collection of original Chinese spoken and written discourse excerpts produced by three Chinese political leaders: Mao Zedong from the age of 28 to 82; Deng Xiaoping, 34 to 88; and Jiang Zemin, 52 to 78. These three leaders represent the three generations of central collective leadership core of the Chinese Communist Party. Even though it represents the voice of the Party and the nation, what they said or wrote reveals their own distinctive language style. Otherwise, their language style would remain the same. The formality of their language is measured by automated text analysis tools including Linguistic Inquiry and Word Count (LIWC), Latent Semantic Analysis (LSA), and Content Word Overlap (CWO). ANOVA results demonstrate formality among three leaders is significantly different, which denotes their speeches and written documents should be a reflection of their own language

style. Results of regression of formality and age controlling words per sentence show formality of all these three leaders is negative related with age across their lifetime with two dramatic declines in their life: one is in their sixties and another is in their late eighties.

## **Individualized Novel Character Emotion Analyzer**

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Novels are constructed by a series of intricate events occurring for main characters with complex relationships. This paper aims to develop an automated character emotion tool to analyze novel characters' emotion in each chapter with latent semantic analysis (LSA). The novel is composed of individual chapters with vivid themes involved in main characters, which are portrayed by intentional word choice either in conversation or narration. This automated character emotion analyzer uses word sets such as words related to affective process including negative emotion and positive emotion in LIWC dictionary. Each chapter is set up as an individual semantic space. Based on these semantic spaces, individualized induced semantic structure is created to evaluate the specific characters' positive and negative emotions. Thus, the highest negative and positive emotion words in each chapter are computed related to particular characters. Therefore, with the development of story plots, the variation of emotion of each character throughout chapters is unfolded to the audience in a scientific way with LSA. The practicability of this analyzer is evaluated by the novel "A song of ice and fire: A game of thrones" which contains many major characters within and between families with intricate relationships. The results show that novel character emotion analyzer is able to make precise measurements of emotion fluctuation of individual characters or multiple characters representing the same family benefits.

## **Building Entities Profiles Through Corpora Extraction**

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This abstract describes an automatic method to construct a natural language resource and the extraction of entities profiles. Specifically, the method's goal is to define a way to assemble natural language texts concerning a set of entities, and to analyze the texts associated to each entity. From this analysis, profiles summarize the entities' information making it possible to perform a rational and systematic analysis, e.g. classifications, rankings. The method starts with the definition of a set of entities to be profiled

and the choice of characteristics to observe. These entities could be, for instance, scholars in a given department and the profile goal may be to establish their research fields. In such an example, the first step is the construction of one corpus to each scholar with its bibliography production (e.g. papers, research projects, students' texts). Each corpus would be processed extracting ontological structures (e.g., concept hierarchy, relations and instances). Next, the produced ontological structure related to scholars would be compared to identify the particularities found in each one of them. From such information, a summary of the relevant concepts to each scholar would indicate its research fields. The extraction and comparison of ontological structures are complex tasks that could benefit from existing techniques. The proposed method is currently being experimented to profile scholars in the Computer Science Department of our University, and thus, providing automated, and free from prejudice, characterization of scholar domains. Such information is helpful to prospective students and industrial partners.

## **PR2 Teleoperation**

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For decades the traditional joystick style controllers have hindered the scientific community. By using the Vicon cameras along with the robot operating system (ROS) we were able to build a prototype that has the potential to dexterously control the PR2's gripper. This is done using a system that integrates ROS, the Vicon system, and a mechanical hand motor that allows the user to interact with the PR2 in an innovative way. When an individual is allowed to control a robot using the natural motion of his or her own hand, something special happens; telemanipulation spontaneously becomes unambiguous. Nearly anyone with a properly functioning hand instantly gains the ability to manipulate a previously complex teleoperational system with ease.

## **Neptune: Aquatic Search and Rescue Robot**

Blake McMillian, Albert Toledo and  
Chutima Boonthum-Denecke (Hampton University, USA)

Robotics is a field that has many facets that make it special. One pivotal aspects of robotics involves aquatic autonomous search and rescue. The traditional means of finding lost individuals is inefficient and time consuming. The research is attempting to change that. A prototype is built from a battery powered motor boat, which is connected to