

Software Engineering Laboratory



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The main directions in research conducted by the Software Engineering Lab members were

- Semantic Methods for Information Retrieval and
- Computer Security

Semantic Methods for Information Retrieval

This year, the focus of our research was on the analysis of measures and approaches for document relatedness evaluation. We investigated the reasons of their construction and usage limitations. We concluded this research with a discourse on challenges of the day in estimating document appropriateness in the domain of information retrieval. This research was done in tight cooperation with Prof. Evgeny Pyshkin, Polytechnical State University, Russia.

We successfully continued our joint project on semantic relatedness measures with Prof. Yannis Haralambous from Institute Telecom Bretagne, France. We developed an extended, thematically reinforced version of Gabrilovich and Markovitch's Explicit Semantic Analysis (ESA), where we obtained thematic information through the category structure of Wikipedia.

Results of our investigations and tests were presented at the 14th International Conference on Intelligent Text Processing and Computational Linguistics (Greece, 2013), the Federated Conference on Computer Science and Information Systems (Poland, 2012), and the 2012 International Conference on Applied Informatics and Communication (China, 2012).

The aim of our work in the area of text mining was to study opinion mining techniques for blogs. Nowadays blogs have gained popularity. They are of interest

to researches in Information Retrieval. Opinion analysis in Chinese is a challenging task. We investigated blog opinion analysis issues. In our experiments, we detected both the positive and negative opinions in the selected blogs. The experiments demonstrated the promising results. This research was supported by Competitive Grant, University of Aizu. Students of our lab were involved in this research. Results of the research were presented at the 7th International Conference on Future Information Technology (Canada, 2012), and the XLIII Conference on Control Processes and Stability (Russia, 2012).

Computer Security

A computer security area attracted attention of our students. Password protection issues and learning technologies to protect data stored on computers were under our investigation. Two papers were accepted for presentations at the following conferences: The 7th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (Germany, 2013), the XLIV Conference on Control Processes and Stability (Russia, 2013).

International Relations

Within the framework of the joint research program between our universities, Evgeny Pyshkin, Associate Prof. of our partner university was working in Aizu as a visiting researcher in April - June 2012. Results of joint research on A Study of Measures for Document Relatedness Evaluation were presented at the Federated Conference on Computer Science and Information Systems, Poland.

In September 2012, Senior Associate Prof. Klyuev during his self-study trip to Russia visited partner universities: Saint-Petersburg State University and Saint-Petersburg State Polytechnical University. He met the public officers and discussed the ongoing short-term student exchange programs and the possible directions of the joint projects.

Senior Associate Professor Mohamed Hamada was working in Nigeria in August 2012 as a Visiting Professor at the African University of Science and Technology (AUST), Abuja. He jointly supervised MSc and PhD Students under the MoU signed between UoA and AUST.

Exchange of Undergraduate Students

Our undergraduate student Mr. Kato and master student Mr. Yi-Ching Zeng visited Saint Petersburg State University, Russia in April 2012 and presented their paper at the XLIII Conference on Control Processes and Stability. Our Russian partners covered local expenses during the stay of our students in Saint-Petersburg.

Foreign Students

Mr. Yi-Ching Zeng, master student from Taiwan, was successfully graduated from our university in autumn 2012. He was enrolled in the dual-degree program

(DDP) in autumn 2011. After graduation, he went back to his home university – Chaoyang University of Technology to continue his study.

A DDP is a system where students can earn two degrees, from the home and the partner university through mutual recognition of credits attained at the universities, and the goal of the program includes fostering excellent human resources educated internationally, as well as strengthening relations between partner universities through concrete exchanges. The Memorandum of Understanding establishing the international dual degree program for students of our university and Chaoyang University of Technology was concluded in 2009.

This is a second time when our lab welcomes the student from Chaoyang University of Technology. The first student Mr. Li was successfully graduated from our university in autumn 2011.

Achievements

Senior Associate Professor Mohamed Hamada was recognized as an IEEE Senior member, Jan. 2013.

Refereed Journal Papers

Refereed Proceeding Papers

[hamada-04:2012] Arreytambe Tabot and Mohamed Hamada. A Multimedia Learning System for Selected Topics of Physics. In *IEEE ITHET 2012*, pages 215–223, New York, June 2010. IEEE, IEEE.

The paper introduces a multimedia learning system for a selected set of physics topics

[hamada-05:2012] Mohamed Hamada. A Learning System for Audio Compression. In *ACM iiWAS 2012*, pages 328–332, New York, Dec. 2012. ACM, ACM.

The paper introduces a learning system for some audio compression techniques

[hamada-06:2012] Hyato Namae Mohamed Hamada. A Multimedia Learning System for MP3 Audio Compression. In *ACM SIGCSE ITiCSE 2012*, page 397, New York, Dec. 2012. ACM, ACM.

The paper introduces a multimedia learning system for MP3 audio compression technique

[vkluev-02:2012] Vitaly Klyuev Evgeny Pyshkin. A Study of Measures for Document Relatedness Evaluation. In *Proceedings of the Federated Conference on Computer Science and Information Systems*, pages 249–256, <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6354356>, September 2012. Polish Information Processing Society.

In this review paper we classified and described measures and approaches for document relatedness evaluation. For the reviewed measures we pointed out the reasons of their construction and usage limitations. We concluded this research with a discourse on challenges of the day in estimating document appropriateness in the domain of information retrieval.

[vkluev-03:2012] Ryo Ueno and Vitaly Klyuev. Cross-Language Information Retrieval using Japanese and English WordNets. In *2012 International Conference on Applied Informatics and Communication*, pages 198–203, December 2012.

Summary of Achievement

This paper presents a new semantic technique to translate and expand Japanese queries for Japanese-English cross-language information retrieval. Expansion is done in two passes: The original Japanese query is disambiguated utilizing the Japanese WordNet. The detected meanings of the terms are expansion terms. After translation applying SPACE ALC, the English WordNet is used to determine the meaning of English terms. These meanings are also added to the final variant of the query. This query is used as expression of the information needs. The preliminary tests utilizing NTCIR Workshop CLIR data set demonstrated promising results.

[vkluev-04:2012] Vitaly Klyuev Kato K. Google App Engine: How to use and work. In *Proceedings of XLIII Conference on Control Processes and Stability (CPS'12)*, pages 440–442, Russia, April 2012. Saint-Petersburg State University, Saint Petersburg State University Publishing Press.

Google App Engine is a very useful tool provided by Google to make web applications easily. App Engine lets us run web applications on Google's infrastructure and App Engine Framework supplies three languages to design high quality applications. We have been working with Google App Engine for one year. We discuss the pros and cons of different technologies utilizing Python. Thus recommendations for the novice users are provided.

[vkluev-05:2012] Vitaly Klyuev Yi-Ching Zeng and Shin-Hung Wu. Opinion Extraction from Chinese Web Blog Corpora. In *Proceedings of XLIII Conference on Control Processes and Stability (CPS'12)*, pages 443–448, Russia, April 2012. Saint-Petersburg State University, Saint Petersburg State University Publishing Press.

Blogs have become a popular communication tool among internet communities. Blogs allow user to express their ideals, comments and share them with others. In this paper, we discuss blog opinion analysis issues.

[vkluev-06:2012] Vitaly Klyuev Yi-Ching Zeng. An Opinion mining Technique for Chinese Blogs. In *Lecture Notes in Electrical Engineering*, volume 164 of *Future Information Technology, Application and Service*, v. 1, pages 281–289. Springer, 2012.

Nowadays blogs have gained popularity. They are of interest to researches in Information Retrieval. Many authors write opinions about things in their blogs. Opinion analysis in Chinese is a challenging task. In this paper, we discuss blog opinion analysis issues. We use blog documents provided by

PIXNET (Taiwanese Internet service provider company) to do experiments. The proposed technique applies ICTCLAS (Institute of Computing Technology, Chinese Lexical Analysis System) to segment the sentences, then utilizes the NTUS dictionary (National Taiwan university Sentiment Dictionary) to find opinion terms in every blog. After that, we use a support vector machine to define the opinions in the blogs. It detects both the positive and negative opinions in the selected blogs. The experiments demonstrate the promising results.

Books

[hamada-07:2012] Mohamed Hamada. *E-Learning: New Technology, Applications and Future Trends*. Number 5. Nova Science Publishing, New York, 2013.

Grants

[hamada-08:2012] Mohamed Hamada and Kadir Tufan. Fatih University Grant, Istanbul, Turkey, 2013.

[vkluev-07:2012] V. Klyuev. An Opinion Mining Technique for Blogs, Competitive Grant, University of Aizu, 2012.

Academic Activities

[hamada-09:2012] Mohamed Hamada, March 2013.
Senior member.

[hamada-10:2012] Mohamed Hamada, March 2013.
Senior Member.

[vkluev-08:2012] V Klyuev, Apr. 2012.
Member

Ph.D and Others Theses

Summary of Achievement

[hamada-11:2012] Naoki Hirao. A Smartphone Application for University Navigation, University of Aizu, 2013.

Thesis Advisor: M. Hamada

[hamada-12:2012] Tomoki Yucho. A Scientific Endnote for Smartphone, University of Aizu, 2012.

Thesis Advisor: M. Hamada

[vkluev-09:2012] Yi-Ching Zeng. Master Thesis: An Opinion Mining Technique For Chinese Blogs, University of Aizu, September 2012.

Thesis Advisor: Klyuev, V

[vkluev-10:2012] Takashi Oikawa. Graduation Thesis: Comparing Search Engines, University of Aizu, March 2013.

Advisor: Klyuev, V

[vkluev-11:2012] Ryo Ueno. Master Thesis: Semantic Query Expansion in Japanese-English CLIR, University of Aizu, March 2013.

Advisor: Klyuev, V