

Division of Computer Engineering

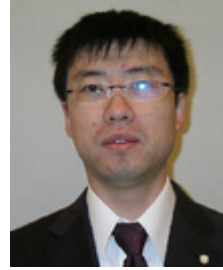
Computer Networks Laboratory



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Refereed academic journal

[leijing-206-006-01:2017] M. Pan and L. Jing. Energy Efficient Data Gathering for WSN-based Context-aware Applications. *International Journal of Ad Hoc and Ubiquitous Computing*, 25(1-2):65–74, 2017.

[y-wu-206-006-01:2017] Junbo Wang Yilang Wu and Zixue Cheng. Activity awareness for development support based on seamless repository. *International Journal of Machine Learning and Cybernetics*, 2017.

As project development gets more intensive, there are increasing needs of development support by reusing shared knowledge objects, such as technical know-how and project achievements, which grow along with developers' activities through multiple support systems. However, there is a large gap of knowledge in providing such development support, because of developers' divergent background knowledge, as well as distinct personal preferences in using different support systems. To bridge the knowledge gap, the major challenge is to improve the information coverage in correlating the knowledge from different support systems. This challenge derives two issues: one is the development data analytics to have a deep insight to the correlations among the knowledge objects that are developing and growing; and the other is the development system integration to utilize knowledge objects that are stored in different support systems. For development data analytics, we propose the development activity awareness using the terms-frequency and chained links-ratio (TFCLR) to measure the integrated contextual and relational correlation among knowledge objects. For development system integration, we implement the seamless repository as an integrated development environment. We experiment with the activity awareness for development support on the ICT field with English conducted as medium of development. The seamless repository integrates multiple support systems to cover more knowledge objects. And in comparison with other mentioned knowledge correlation measures, the one using TFCLR covers the most detailed information in knowledge objects. The quantified and visualized knowledge correlation produced by this study is a useful tool to bridge the knowledge gap in development.

[y-wu-206-006-02:2017] Hui-Huang Hsu Zixue Cheng Yilang Wu, Junbo Wang. A seamless repository for pervasive teamwork. *International Journal of Web and Grid Services*, 12(3):273–295, January 2016.

Mobile cloud-based collaborative workflow has pervasively empowered teamwork. However, it still suffers from collaborative workflow barriers, such as

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workflow complexity, poor communication, and teamwork disruption. To ease collaborative workflow barriers, we propose and develop a seamless repository by integrating multiple support systems into a three-layered framework. Under the premises of availability, connectivity, and transparency, the three-layered seamless repository strengthens the collaborative workflow in pervasive teamwork. It supports various critical collaborative workflow activities such as issue tracking, revision control, content management, system visualisation, onsite participation tracking, and team communication. After a test period of one year, active teamwork involvement has been observed, which implies that the barriers are relieved. Furthermore, several hidden patterns of teamwork are discovered through the seamless repository, which are useful to improve future support for pervasive teamwork.

[y-wu-206-006-03:2017] J. Wang; Y. Wu; N. Yen; S. Guo; Z. Cheng. Junbo Wang, Yilang Wu, Neil Yen, Song Guo, and Zixue Cheng. *IEEE Communications Surveys & Tutorials*, 18(3):1758–1778, 2016.

Disaster management is a crucial and urgent research issue. Emergency communication networks (ECNs) provide fundamental functions for disaster management, because communication service is generally unavailable due to large-scale damage and restrictions in communication services. Considering the features of a disaster (e.g., limited resources and dynamic changing of environment), it is always a key problem to use limited resources effectively to provide the best communication services. Big data analytics in the disaster area provides possible solutions to understand the situations happening in disaster areas, so that limited resources can be optimally deployed based on the analysis results. In this paper, we survey existing ECNs and big data analytics from both the content and the spatial points of view. From the content point of view, we survey existing data mining and analysis techniques, and further survey and analyze applications and the possibilities to enhance ECNs. From the spatial point of view, we survey and discuss the most popular methods and further discuss the possibility to enhance ECNs. Finally, we highlight the remaining challenging problems after a systematic survey and studies of the possibilities.

[z-cheng-206-006-01:2017] Cheng Z., Zhao Q., Ding S., Ben A., and Chen W. Distinguished University Focusing on Computer Science and Engineering Education for Cultivation of Global IT Innovators. *Jisuanji Jiaoyu (Computer Education)*, (5):8–12, 2017.

The University of Aizu is one of the first group of universities in Japan that are selected in the Top Global University project. We introduce three char-

acteristics of the university: internationalization, IT specialty education, and the technical innovational and business startup in new era. We will also discuss the related educational research directions, and introduce the methodology and curriculum to achieve the education goal for educating innovative IT talents.

Refereed proceedings of an academic conference

[aiguo-206-006-01:2017] Masayuki Tanimoto and Aiguo He(Hirokuni Kurokawa). Omnidirectional FTV. pages 1–6, 2017.

FTV (Free-viewpoint Television) enables users to view a 3D scene by freely changing the viewpoint. It was developed based on ray-space representation. Omnidirectional FTV is 360-degree video with free viewpoint function. Omnidirectional FTV with horizontal parallax is realized by using 3-dimensional (3D) spherical ray-space. Here, 3D spherical ray-space is extended to 4D to realize vertical parallax. Ray capture and view synthesis are analyzed in 4D spherical ray-space and verified experimentally. Omnidirectional views with full parallax are successfully generated.

[leijing-206-006-02:2017] L. Jing, Z. Dai, and Y. Zhou. Wearable Handwriting Recognition with an Inertial Sensor on a Nail. In *The 14th IAPR International Conference on Document Analysis and Recognition*, Nov. 2017.

[leijing-206-006-03:2017] L. Jing. A Lightweight Method to Detect Tooth-brushing Area Using a Six Axis Inertial Sensor. In *the 6th IEEE Global Conference on Consumer Electronics*, Oct. 2017.

[leijing-206-006-04:2017] L. Jing and Z. Cheng. Recognition of Daily Routines and Accidental Event with Multipoint Wearable Inertial Sensing for Seniors Home Care. In *The 2017 IEEE International Conference on Systems, Man, and Cybernetics*, Oct. 2017.

[y-wu-206-006-04:2017] Shanshan Zhang Amitangshu Pal Junbo Wang Yilang Wu, Krishna Kant. Disaster Network Evolution Using Dynamic Clustering of Twitter Data. In *2017 IEEE 37th International Conference on Distributed Computing Systems Workshops (ICDCSW), Atlanta, GA, 2017*, pages 348–353, 2017.

Ad hoc smartphone networks can be used to augment communications degraded by disasters provided that the individual ad hoc clusters can reach

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some 'connection gateways' to get out to the Internet. This capability can be provided by devices in the surrounding area that retain cellular connectivity in addition to the connectivity provided by the specially deployed emergency equipment, if any. The disconnected areas may not be known until they are back online; however, we need a mechanism to estimate them so that the gateway devices can be best recruited to provide the connectivity. This needs to be done in a dynamic environment because of the significant mobility in the wake of the disaster. In this paper, we propose a mechanism to estimate regions that are likely to be dense but disconnected, and with significant connected devices in and around them. Such regions are most likely to benefit from the ad hoc network. Because of the lack of direct information on people (or smart-phone) density, we attempt to do this by analyzing the twitter data. We use our approach on the twitter data available on hurricane Sandy in 2012.

[y-wu-206-006-05:2017] Sato Kouichi Zixue Cheng Yilang Wu, Junbo Wang. A Dynamic Spatial Clustering for Emergency Response based on Hierarchical-Partition Model. In *Procedia Computer Science*, editor, *The 8th International Conference on Advances in Information Technology*, volume 111, pages 485–492, 2017.

Understanding the situation distribution is a fundamental but important step in the emergency response to disaster. There are various emergency related spatial data available on Internet; however, it is still a big challenge in clustering the dynamic big spatial data. In this study, we provide a dynamic spatial clustering (DSC) to efficiently load and cluster the spatial big data based on a hierarchical-partition model (HPM). We have modeled the DSC to understand the distribution of emergency (e.g. Kumamoto earthquake in May 2016) from spatial data in tweets. The major contributions in the HPM-based DSC include loading dynamic big spatial data with optimal utilization of external memory, and rapid clustering to detect the dense regions of targeted emergency.

[z-cheng-206-006-02:2017] Wu Y. and Kawaguchi T., Jing L., Wang J., and Cheng Z. Campus Digital Signage: Connection of Correlated Information between Distributor and Receiver. In *2017 31st International Conference on Advanced Information Networking and Applications Workshops (WAINA)*. IEEE, May. 2017.

The paper discuss how to effective share information in a university campus environment

[z-cheng-206-006-03:2017] Jing L. and Cheng Z. Recognition of daily routines and

accidental event with multipoint wearable inertial sensing for seniors home care. In *2017 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*. IEEE, Oct. 2017.

This paper presents a method for detecting daily activities as well as accidents. Implementation and experiments are also shown

[z-cheng-206-006-04:2017] Sato K., Wang J., and Cheng Z. Design of a Method to Support Twitter based Event Detection with Heterogeneous Data Resources. In *2017 IEEE 8th International Conference on Awareness Science and Technology (iCAST)*. IEEE, Nov 2017.

This paper discussed a method by which information on events detected by analysis of Tweets can be collected and extracted.

Unrefereed proceedings of an academic conference

[aiguo-206-006-02:2017] Masayuki Tanimoto and Aiguo He(Hirokuni Kurokawa). Ray-Space Processing for Omnidirectional FTV. In *IEICE Technical Report*, pages 31–36, Tokyo, Nov. 2017. IEICE, IEICE.

[leijing-206-006-05:2017] L. Jing and M. Yamazaki. Motion Capture with Inertial Sensors for Intuitive Robot Control. In *The 6th workshop of intelligent Home Robotics*, Mar. 2017.

Writing a part of textbook or technical book

[y-wu-206-006-06:2017] Junbo Wang Yilang Wu. *A Web-based System with Spatial Clustering to Observe the Changes of Emergency Distribution using Social Big Data*, chapter Behavior Engineering and Applications. the Springer International Series on Computer Entertainment and Media Technology. Springer International Publishing AG, Switzerland, 2018.

Research grants from scientific research funds and public organizations

[aiguo-206-006-03:2017] Aiguo He. Contributed to the success of a research project subsidized by Fukushima Prefectural Academic Education Promotion Foundation. 5 public lectures have been performed., 2017.

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[y-wu-206-006-07:2017] Yilang Wu Junbo Wang. Evolving Clustering for Streaming Spatial Big Data in Disaster Scenario, June 2018.

[y-wu-206-006-08:2017] Jun Inami Makoto Yokoo Akira Yagihashi Takuya Watanabe Yilang Wu Junbo Wang Yuji Mitsunaga Minatsu Ariga Tomoyuki Ikeda Tatsuki Kawaguchi, Takahiro Aoki. An ICT Framework of Globalization Branding Strategies Phase II: To Deliver the Local Attractiveness with Social Listening Data to the World, June 2018.

Academic society activities

[y-wu-206-006-09:2017] Qiangfu Zhao Goutam Chakraborty Iwate Prefectural Tadahiko Murata Robert Kozma Arkady Zgonnikov, Yilang Wu, October 2018.

Session C21: HUMAN AWARENESS COMPUTING: COMPUTATIONAL AWARENESS, URL: <http://www.smc2018.org/approved-special-sessions/c21-human-awareness-computing-computational-awareness/>

Advisor for undergraduate research and graduate research

[aiguo-206-006-04:2017] Makoto Yamaguchi. A Study of HCI for PHW Based Presentation Support, University of Aizu, 2017.

Thesis Advisor: Aiguo He

[aiguo-206-006-05:2017] Yuka Katsushima. SKP-based Learning Contents Creation and Recommendation for C programming beginners, University of Aizu, 2017.

Thesis Advisor: Aiguo He

[aiguo-206-006-06:2017] Yu Yan. Programming Learning Support Methods based on Adaptive Hypermedia and Program Visualization, University of Aizu, 2017.

Thesis Advisor: Aiguo He

[z-cheng-206-006-05:2017] Tomoaki Aihara. Graduation thesis, School of Computer Science and Engineering, Mar. 2018.

Thesis Advisor: Z. Cheng

[z-cheng-206-006-06:2017] Yuta Sato. Graduation thesis, School of Computer Science and Engineering, Mar. 2018.

Thesis Advisor: Z. Cheng

[z-cheng-206-006-07:2017] Huicong Yu. Master thesis, Graduate School of Computer Science and Engineering, Sep. 2017.

Thesis Advisor: Z. Cheng

[z-cheng-206-006-08:2017] William Hutchinson Putnam III. Master thesis, Graduate School of Computer Science and Engineering, Mar. 2018.

Thesis Advisor: Z. Cheng

[z-cheng-206-006-09:2017] Fumihiro Yamada. Master thesis, Graduate School of Computer Science and Engineering, Mar. 2018.

Thesis Advisor: Z. Cheng

[z-cheng-206-006-10:2017] Daisuke Abe. Master thesis, Graduate School of Computer Science and Engineering, Mar. 2018.

Thesis Advisor: Z. Cheng

[z-cheng-206-006-11:2017] Takeyuki Sato. Master thesis, Graduate School of Computer Science and Engineering, Mar. 2018.

Thesis Advisor: Z. Cheng

Contribution related to the building or operation of the university computer system

[y-wu-206-006-10:2017] Development and Maintenance of the Campus Digital Signage System

Other significant contribution toward university planning, management, or administration

[aiguo-206-006-07:2017] Contributed to the success of PC-Koshien 2017, the high-school student programming contest hold in UoA every year since 2003. I have been working for PC-Koshien since its first time.

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[z-cheng-206-006-12:2017] Successfully achieved MEXT project “Top Global University” as a leader

Contributions related to regional education

[z-cheng-206-006-13:2017] Memorial speech for the 2017 General Assembly of Woman Protection of Rehabilitation of Ryo-Numa Area District, with Title Laughter and Communication - Comparison of Family Conversation between Japan and China Apr. 28, 2017, at the Aizu bange-machi Central Public Hall

Did you participate in students recruitment, support the alumni, and/or contact with student’s parent? (Yes or No) If yes, please describe what you did.

[y-wu-206-006-11:2017] International students recruitment organized by Center for Globalization

Did you participate in Public Lectures, and/or Open Campus? (Yes or No) If yes, please describe what you did.

[aiguo-206-006-08:2017] Computer Science Summer Camp @ UoA 2017: Opened a new Course Basic C Programming. This year, as the first time, 10 foreign students were invited. I have designed the English version of above course for the success of that invitation.; Public lectures;