Center for Globalization

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There are 4 main task for SGU office, which are Honors program, ICTG program, internship program and governance. In the last year, we have finished the regulations related to Honors program, added new admission requirements for ICTG program, established 2 new hubs in China for internship program, and planned to visit 1 or 2 similar university selected by SGU project. We also met the mid-term evaluation of MEXT, and received 3 pointed points. The details will be described as follows.

About the mid-term evaluation of SGU project, we received 3 pointed points which are 1) improving the English level of students, 2) providing the opportunities or building the environments which can make the Japanese students communicate with international students in regular course. 3) third-party certification for curriculum. In order to improve and solve the pointed points, we have put forward some proposals in collaboration with relevant departments in university, and the proposals are realized or in process. Among the 3 pointed points, the first one is a not easy job, we need to consider the other way, for example, improve the English score in admission requirement.

About the Honors program, it consists of 2 types, which are 1) Integrated Undergraduate-Master's Program and 2) Unique Talent Discovery Program. Now, the Honors program has started to receive the application of students. For Honors program, the problem is Honors year, students cannot apply scholarship in this period. If we can set this period as an internship period, the problem of scholarship can be avoided.

About the ICTG program, a new admission requirements - A-level of Cambridge are added. Besides SAT, ACT, IB, HKDSE and Gaokao of China, our recruiting targets can cover the main education system in the world. As we known, the special selection of China is given up. Therefore, we have to meet the problem

of 2019 admissions. Because the number ICTG students come from China is more than 30 persent. In order to keep the number of ICTG students, we plan to do a STEM camp, and invite high school students to visit our university. We hope this event can help the high school students to understand our university deeply. In the other hand, we also plan to improve the 2+2 program.

About the internship program, we established 2 new hubs, which are in Shenzhen, China and Dalian China. Based on the 2 hubs, we are going to create more than 4 new internship programs, in order to provide more opportunities of internship to the students. Now, related SOVO in Dalian, there are 3 internship programs are in preparing, and 1 internship program related to Shenzhen is started to preparing.

About the governance, we planned to visit some universities of selected by SGU project, and improve the future works by learning the experiences and exchange opinions.

Refereed academic journal

[j-wang-410-080-01:2017] J. Wang; S. Guo; Z. Cheng; P. Li; J. Wu. Optimization of Deployable Base Stations With Guaranteed QoE in Disaster Scenarios. *Optimization of Deployable-Base-Stations with Guaranteed QoE in Disaster Scenarios*, 66(7):6536 – 6552, July 2017.

Reconstructing emergency communication networks (ECNs) quickly after a disaster occurs is critical so that people can share information and confirm their safety. In recent studies, deployable base stations (DBSs) have demonstrated their ability to reconstruct an ECN. However, considering limited resources, it is impossible to deploy DBSs in the whole disaster area. The above shortage can be covered by deploying small-cell networks (i.e., low-power transmission base stations) in areas with high communication demand, e.g., in refuges. Considering the above two-tier ECN, in this paper, we study its performance and optimization issue with the objective of minimizing the number/density of DBSs while guaranteeing acceptable coverage probabilities for both communication tiers. The majority of current research focuses on scenarios where the base stations follow a homogeneous Poisson point process of coverage probability. It is difficult to transfer the results to other applications, e.g., when communication resources are shared, such as by refugees following a disaster. In such cases, the distribution of users is closer to that of a Poisson cluster process. We then investigate the optimization method to minimize the number/density of DBSs. We used Monte Carlo methods with various parameter choices to evaluate the results and to determine the accuracy of our evaluation.

[j-wang-410-080-02:2017] J. Wang and Z. Cheng. Optimal Deployment and Traffic Flows in Mobile Mesh Network after a Disaster. *International Journal of Ad Hoc and Ubiquitous Computing*, 25(1-2):97–108, January 2017.

It is a critical research problem to quickly reconstruct a communication system after a disaster. One resolution is to deploy mobile mesh routers MMR in the disaster area to guarantee the connection of users. However, it is still a challenge to find an optimal deployment of MMRs to maximally satisfy users while ensuring a fluent and reliable communication network. In this paper, we focus on the above problems and propose a communication-demand-oriented deployment method CDODM and a global-data-traffic routing optimisation method GTFROM for a disaster. Our main contributions are 1 formalisation and optimisation of computation transmission cost in CDODM and 2 formalisation and optimisation traffic flows in GTFROM. Through the evaluation in NS3, user

satisfaction calculated based on recorded throughput in NS3 can be enhanced clearly in the proposed solutions. In scalability study, the proposed methods works well, with changing range of disaster areas, number of MMRs and communication demands.

[j-wang-410-080-03:2017] Yilang Wu; Junbo Wang; and Zixue Cheng. Activity awareness for development support based on seamless repository. *International Journal of Machine Learning and Cybernetics*, pages 1–16, July 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.

Refereed proceedings of an academic conference

[j-wang-410-080-04:2017] Yilang Wu; Krishna Kant; Shanshan Zhang; Amitang-

shu Pal; and Junbo Wang. Disaster Network Evolution Using Dynamic Clustering of Twitter Data. pages 5–8, 2017.

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

[j-wang-410-080-05:2017] Y. Wang; M. C. Meyer; J. Wang; and X. Jia. Delay Minimization for Spatial Data Processing in Wireless Networked Disaster Areas. In *2017 IEEE Global Communications Conference GLOBECOM*. IEEE, 2017.

Spatial big data analytics has become possible with the data collected from the sensors in smart phones, which can support decision-making in disaster scenarios. However, sometimes the regular communication infrastructure can be destroyed after disasters. Movable base stations (MBS), as studied by the company NTT, offer an easily deployable solution to construct an emergency communication network, but are not suitable for transmitting big data from sensing devices to the cloud for data processing in the cloud. To solve this issue, we studied a novel algorithm to process spatial big data efficiently in a wirelessly networked disaster area that uses multiple MBSs. More specifically, we proposed a novel algorithm to minimize overall delay for spatial data processing in wirelessly-networked disaster areas (SDP-WNDA), to enable quick responses to data analysis. Our proposed model and genetic algorithm solution showed to have a reduced maximum end- to-end (E2E) delay over various network sizes, when compared to some conventional solutions. For the realistic constraints, the cloud solution was the best conventional method, followed by the system which used the fog nodes to process as much data as possible, but the genetic algorithm (GA) had a slight advantage over all other methods. However, as the computation rate, uk, was increased, the maximum processing algorithm got much stronger. Also, as the communication capacity, R, was increased, the cloud computing solution was more successful. The fact that none of the conventional cases matched the capabilities of the GA for increased computation or increased transmission rates suggests the need for this to be investigated even further.

[j-wang-410-080-06:2017] Koichi Sato; Junbo Wang; and Zixue Cheng. 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, 2017.

There is a high demand for observation of events of public concern in a real time manner by analyzing Big Data. Twitter is a suitable data resource for

event detection due to amount of data/users in the Twitter system, and high frequency of data generation. The possibility of event detection by tweets has been proved by a lot of researches. However it still has the following two problems. The first problem is the reliability of information, since tweets are always very noisy and fake information appears in them. The second problem is the lack of enough information for each tweet. It is because a tweet is restricted to 140 letters, so that it can not describe much information. One possible solution is to retrieve additional information, which is related to a Twitter based event detection result, from heterogeneous data resources such as articles, Web Pages, blog posts etc. If the information is retrieved, it can be used to validate the detection result and also provide as further information to enhance the detection result. However properly retrieving related contents from heterogeneous data resources is not easy because of different types of data. To solve the above problem, we propose a method to retrieve additional information related to a set of tweets, which is detected as an event, from heterogeneous data resources by measuring similarity (distance) between them with Normalized Compression Distance. We mainly consider articles in the web as the additional information for Twitter based event detection, since they are well validated and edited. We evaluate the proposed method in experiments, and the results show that it has high anti-noise capability and performs well in practical situation.

[j-wang-410-080-07:2017] Michael Conrad Meyer; Yu Wang; and Junbo Wang. Cost Minimization of Data Flow in Wirelessly Networked Disaster Areas. In *2018 IEEE International Conference on Communications (ICC)*. IEEE, 2018.

Big data analytics has started to use data collected from the sensors in smartphones. This data may be used by disaster response teams for locating problems. But the regular communication infrastructure can be destroyed after disasters. Movable base stations (MBS), as studied by the company NTT, offer an easily deployable solution to construct an emergency communication network (ECN), but are not suitable for transmitting big data from sensing devices to the cloud for data processing in the cloud. To address this issue, MBSs have been equipped with processing capabilities of their own, which creates an MBS-based Fog-computing Network. We proposed a novel algorithm to minimize the overall cost of the system while maintaining 0 data overflow. This will allow the resources to be used at the most efficient level. Our genetic algorithm solution had a reduced system cost over various network sizes when compared to some conventional solutions. During the simulation, it was clear that the best

conventional method for preventing data overflow was the fog-based solution, but its cost was quite high. The cloud-based solution had the lowest cost but would lead to a large amount of data overflow, which would need to be cached. The GA-based solution maintained the ideal solution throughout the variation of all bandwidth parameters: the processing rate, the data compression ratio, and the cost coefficient ratio. Because none of the conventional solutions were able to match the capabilities of the GA for the current constraints, we believe that this should be investigated further with a faster algorithm.

Unrefeered proceedings of an academic conference

[kawaguch-410-080-01:2017] T. Kawaguchi. Developing the University Faculty and Staff Members' Competences and Skills for Globalization, Especially Those Who Deals with International Education and Exchanges. In *In proceedings of 15th Annual Conference, Japan Academy of Human Resource Development*, pages 13–14. Japan Academy of Human Resource Development, 2017.

[kawaguch-410-080-02:2017] T. Kawaguchi. and S. Tei. Long-term Service Learning for the Local Community Engagement in Japan. In *In proceedings of the 5th University-Community Engagement Conference (UCEC)*. University-Community Engagement Conference, 2017.

[kawaguch-410-080-03:2017] L. Jing J. Wang Z. Cheng Y. Wu, T. Kawaguch. Campus Digital Signage: Connection of Correlated Information between Distributor and Receiver. In *In proceedings of 31st International Conference on Advanced Information Networking and Application Workshops, AINA 2017 Workshop*, pages 581–582. IEEE Computer Society, 2017.

Writing a part of textbook or technical book

[j-wang-410-080-08:2017] Junbo Wang; Yilang Wu; Hui-Huang Hsu and ZixueCheng. *Big Data Analytics for Sensor-Network Collected Intelligence*, chapter Chapter 7 - Spatial Big Data Analytics for Cellular Communication Systems, pages 153–166. Elsevier, 2017.

Cellular communication (CC) is the most popular way to connect people together for real-time communication and data transmission. CC systems have

an enormous number of users, and large amounts of data, including user- and system-oriented data, are generated in CC systems every day. To continually provide better service, CC systems are encountering new challenges, such as unbalanced crowd communication behaviors of users and congestion from huge requests of high-quality video transmission. It has become an emerging research topic to study the huge data generated from CC systems and to predict the behaviors of CC systems, so that better quality of services can be provided. In particular, spatial big data analytics, which primarily handles spatial data, is important, because most data generated from CC systems are spatiotemporal-oriented data, and analyses of these data can significantly support the development of CC systems. In this chapter, we comprehensively survey methodologies of spatial big data analytics, study possible applications to support CC systems with spatial big data analytics, and highlight challenging issues.

[j-wang-410-080-09:2017] Yilang Wu and Junbo Wang. *Behavior Engineering and Applications*, chapter A Web-Based System with Spatial Clustering to Observe the Changes of Emergency Distribution Using Social Big Data. Springer, 2018.

Understanding the changes of emergency distribution is an important step in the response to disaster. There are various emergency-related big data available on Internet; however it requires a complex system to use big data for emergency observation. In this study, we propose a Web-based system with spatial clustering to enable the observation to the changes of emergency distribution using social big data. Based upon the widely available Web technology, the proposed system is designed in three components, the social big data scrubbing, spatial big data clustering, and visualizing the changes of emergency distribution. And we applied the observations on two emergency incidents using the Twitter data, one is the Kumamoto earthquake 2016, and the other is the New York Hurricane Sandy 2012.

Research grants from scientific research funds and public organizations

[j-wang-410-080-10:2017] Zixue Cheng Junbo Wang and Neil Yen.   JST-NSF Joint Funding, Strategic International Collaborative Research Program, SICORP, entitled.

[kawaguch-410-080-04:2017] et al. T. Kawaguchi. An ICT Framework of Global-

ization Branding Strategies - to Support Data-driven Promotion of Local Communities -, 2017.

[kawaguch-410-080-05:2017] T. Kawaguch. Developing a Global Competency for STEM Students: Analyzing the Effectiveness of Project-Based Service Learning (PBSL) in Comparison with Different Educational Setting in the US, Thailand, and Japan, 2017.

Academic society activities

[j-wang-410-080-11:2017] Junbo Wang, 2018.

Workshop Chair The 1st Workshop on Collaborative Intelligence for Big Data joint with The IEEE Global Communications Conference 2018, Abu Dhabi, UAE, Dec. 2018

[j-wang-410-080-12:2017] Junbo Wang, 2018.

Workshop Chair Resilient and Intelligent Emergency Systems Communication Networks (RISCN) Workshop, The 14th International Conference on Wireless Communication and Mobile Computing IWCMC 2018

[j-wang-410-080-13:2017] Junbo Wang, 2018.

Program Chair The 9th IEEE International Conference on Awareness Science and Technology (iCAST 2018)

[kawaguch-410-080-06:2017] T. Kawaguchi, 2017.

Active Member

[kawaguch-410-080-07:2017] T. Kawaguchi, 2017.

Active Member

Contributions related to syllabus preparation

[kawaguch-410-080-08:2017] Improved the Syllabus for the Intercultural Leadership Training - International Understanding and Regional Innovation for the Engineering Students

[yumitsu-410-080-01:2017] wrote the syllabus for the Extracurricular Activity Course II: Internship III (Overseas Dalian).

[yumitsu-410-080-02:2017] wrote the syllabus for the Extracurricular Activity Course II: Internship II(Domestic A).

[yumitsu-410-080-03:2017] improved the syllabus for "Internship III (Overseas Silicon Valley)" and "Culture and History of Aizu".

Contribution related to the creation of the annual schedule

[j-chen-410-080-01:2017] Create the AY2018 schedule for SGU project.

[kawaguch-410-080-09:2017] Managed and organized global activities on campus, and actively supported inbound and outbound students under the mid-term and annual goals and schedule.

Contribution related to toward equipment management, classroom management, building management, and crime or fire prevention.

[kawaguch-410-080-10:2017] Renovated the Global Lounge and responsible of taking care of the Global Lounge.

Employment guidance

[kawaguch-410-080-11:2017] Supported to revised the international students' resume for working in Japan and assisted to get an internship and job overseas.

Advisor of a student club or circle

[kawaguch-410-080-12:2017] Team Nakagoya: being an adviser of the local revitalization activities with the global team of 55 students.

Contribution related to student management(for example, solution of a student-related problem)

[j-chen-410-080-02:2017] As the class adviser of ICTG students who entered 2016 and 2017, I have support the students whose academic ability is poor. As the results,

Summary of Achievement

> 2 students improved their achievement by worked hard. But there are 2 students didn't improve their achievement. Therefore, I need to consider other way to help the students.

[kawaguch-410-080-13:2017] Consulted the international student's financial issues, visa extension, etc. Communicated with correspondents of partner university when dispatching students got a trouble.

[yumitsu-410-080-04:2017] contributed to solving problems of ICTG students' daily lives.

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

[yumitsu-410-080-05:2017] proposed the modified specification of the web server system "University of Aizu Challenger Badge System" and entrusted it to the system integrator.

Contribution related to on-campus/off-campus publicity work

[j-chen-410-080-03:2017] In order to let more people to understand our university, I have prepared the documents and image files for the site of THE, in which, working, studying and living in our university are introduced. Furthermore, I have updated the information of our university on the recruiting site of Keystone and poseted the information of our university on encyclopedia site of baike.baidu.com.

[kawaguch-410-080-14:2017] promoted our university and global activities at the partner univeristy and local communities.

Contribution related to computer literacy education for university faculty members

[j-chen-410-080-04:2017] I have help the Exercise of Computer literacy.

Contribution related to educational planning management

[j-chen-410-080-05:2017] I have applied FY 2018 Subsidy of Fukushima Prefectural Foundation with other professors, although we did not succeed. The purpose of this project is promoting the communication among the senior high students of local and Hong Kong in a series of open lectures and other events related to multi-culture. In the future. we plan to promote the communication among the senior high students of local and the other region besides Hong Kong.

[kawaguch-410-080-15:2017] Co-leading faculty memberof the Creative Development Program at the University of Aizu within the Education Network for Practical Information Technologies (enPiT2)

[kawaguch-410-080-16:2017] Proposal was accepted as the AY2018 Japan Student Services Organization (JASSO) Student Exchange Support Program (Scholarship for Short-term Study in Japan and Oversea) was accepted, and UoA dispatched and hosted the students to/from partner universities and institutions.

[yumitsu-410-080-06:2017] contributed to the enactment of the procedure for the operation of "University of Aizu Challenger Badge System", and also contributed to the actual operation.

[yumitsu-410-080-07:2017] contributed to "University of Aizu Challenger Badge System Review Committee" as the member and the administrative secretariat.

[yumitsu-410-080-08:2017] contributed to the operation of Project Manager committee of SGU as the host.

[yumitsu-410-080-09:2017] totally improved "Dalian Overseas Internship Program", planed and implemented it as the new subjects, tought to students as pre-training and post-training, and dispatched students to Dalian.

[yumitsu-410-080-10:2017] implemented "Silicon Valley Internship Program", dispatched students to Silicon Valley, and supported several presentation events in Silicon Valley.

[yumitsu-410-080-11:2017] contributed to the selection of recipients of SGU scholarship as the interviewer.

Contribution related to planning administration for research, research conferences, or international research

Summary of Achievement

[j-chen-410-080-06:2017] I have provided the analyzed results of recruiting activities related to international students for the paper which is submitted to a Journal of Japanese Association of Higher Education Research. This paper was accepted by the journal of 2018.

[kawaguch-410-080-17:2017] Supported the international conferences and workshops on campus financially with the Office for Strategy of International Programs.

[yumitsu-410-080-12:2017] supported the graduation research as the one of advisors at Computer Network Laboratory.

Other significant contribution toward university planning, management, or administration

[j-chen-410-080-07:2017] With the annual budget cuts, I considered to integrate the jobs of SGU. That is, integrate some functions into departments with similar functions in our university. At present, the jobs of enrolling international students and honors program have been realized to co-work with the Academic Affairs Section. Because of this change, we can have more resourse to promote the internship program and other international exchange program.

[kawaguch-410-080-18:2017] Director, Office for Strategy of International Programs, Center for Globalization, the U of Aizu

[kawaguch-410-080-19:2017] Working Group member, the General Plan on Establishment of the Evaluation Office of the Public University Cooperation, the U of Aizu

[kawaguch-410-080-20:2017] Co-leading faculty member, enPiT2 (Educational Network for Practical Information Technology), U of Aizu

[kawaguch-410-080-21:2017] Member, Top Global University Project Mangers Meeting, U of Aizu

[kawaguch-410-080-22:2017] Member, Top Global University Project Committee II: Student Support and Services, U of Aizu

[kawaguch-410-080-23:2017] Member, Top Global University Project Committee III: Intern and Entrepreneurship, U of Aizu

Contributions related to regional education

[j-chen-410-080-08:2017] Please refer to No. 5110.

[kawaguch-410-080-24:2017] Fukushima Prefectural International Association and JICA Nihonmatsu invited me as a keynote speaker to give a seminar on the Intercultural Leadership Training - Motivations and Practices - in the Fukushima Global Human Development Trainer Seminar at JICA Nihonmatsu, Japan, June 17 - 18, 2017

[kawaguch-410-080-25:2017] invited to the 2nd Local Revitalization Steering Promotion Committee, Junior College Division of the University of Aizu, Japan, January 16, 2018, and give a presentation on a case study of the ICT Framework of Globalization Branding Strategies - to Support Data-driven Promotion of Local Communities

Proposal/implementation of a company plan that addresses the current status of the region and establishes ties with the university.

[kawaguch-410-080-26:2017] implemented the revitalization project with the faculty members of the junior college to create theICT Framework of Globalization Branding Strategies- to Support Data-driven Promotion of Local Communities

[yumitsu-410-080-13:2017] contributed to the realization of the ideathon with regard to internal revitalization of Aizu General Holdings on Sep, 2017.

[yumitsu-410-080-14:2017] contributed to the realization of the health promotion hackathon sponsored by Aizu General Holdings on Feb, 2018.

[yumitsu-410-080-15:2017] invited students from Aizu High School to the lecture on "Culture and History of Aizu" and discussed with our university students includeing international students, and invited faculty members of Aizu Politechnic and Aizu Junior College and the president of the local venture company to discuss future industories of Aizu.

[yumitsu-410-080-16:2017] developed the program to train young ICT leaders for high school students in Hong Kong and Aizu.

Proposal/implementation of a future industry plan

Summary of Achievement

[j-chen-410-080-09:2017] The Fukushima is a prefecture dominated by agriculture and rich in tourism resources. In the future, I think to develop tourism agriculture, and promote the export of agricultural products, which is a suitable choice. Therefore, we need to assist local small and medium-sized agricultural enterprises to establish Internet marketing channels by establishing channels based on faculty and students. At the same time of promoting the development of the local economy, it will provide application stages for our study.

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.

[j-chen-410-080-10:2017] I did the activities for recruiting. I went to Thailand and China to attend the recruiting fairs. I have also visited the parents of the high school students, and introduced our university to their parents.

[kawaguch-410-080-27:2017] promoted our university and global activities to the high school students, and contacted with the teachers and parents in oversea high school in Hong Kong, Thailand, China, and etc.

Did you participate in Faculty Development? (Yes or No) If yes, please describe what you did.

[kawaguch-410-080-28:2017] was invited to the enPiT Faculty Development (FD) Symposium, Ehime University, Japan, September 19, 2017, and a presentation of the new approaches with the Creative Development Program at the University of Aizu was

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

[j-chen-410-080-11:2017] I took part in the open campus event and introduced Geek Dojo to the visitors.

[kawaguch-410-080-29:2017] invited to the 1st ACM Chapter Networking Seminar on Globalization and Innovative Thinking, The University of Aizu, Japan, November

26, 2017, and give a presentation on the Globalization Efforts at the University of Aizu.

[kawaguch-410-080-30:2017] Participated in Open Campus in both August and Octoberto promote our internationalization to high school students and their parents with Office for Strategy of International Programs, and collaborated with local residents to sell the local products and foods.

[yumitsu-410-080-17:2017] contributed to the seminar "Thinking of working" sponsored by the Center for Cultural Research and Studies of the University of Aizu and the Center for Lifelong Learning of Aizu-Wakamatsu city, as the presentor who talked his own professional experience and discussed working.