Software Engineering Laboratory

Vitaly V. Klyuev
Professor

Mohamed Hamada
Senior Associate Professor

Evgeny Pyshkin
Senior Associate Professor

In 2016, a new faculty member, Senior Associate Prof. Evgeny Pyshkin joined the laboratory. The main directions in research conducted by the Software Engineering Lab members were

- Semantic Methods for Information Retrieval
- Technologies for Internet Applications
- Computer Security
- Intelligent Systems and Learning Technologies
- Human-Centric Computing
- Software Engineering

Prof. Klyuev leads the Semantic Methods for Information Retrieval, Technologies for Internet Applications, and Computer Security directions. The focus of the research by Prof. Hamada is on Intelligent Systems and Learning Technologies. Main scientific interest by Prof. Pyshkin is in Software Engineering and Human-Centric Computing.

Semantic Methods for Information Retrieval

Nowadays, the focus in the research on text mining shifted to methods of analysis of the relatively small text. An example is the Twitter. An analysis of these messages from an online social networking services is very important for theory and practice. For commercial sale companies, it may help in determining the interests of the customers in different type of products, for example. Usage of the technological instruments may help in preventing crimes. A new generation of

mobile devices drastically influence the life of the ordinary people. Virtual communication between them is prevalent. Pieces of information, they exchange, are becoming shorter. Methods of semantical analysis of short texts are challenging. Our students were involved in this research. Results were presented at the CPS'16 international forum.

Technologies for Internet Applications

The dynamic nature of the current society demands the business to be very much flexible. The best way to find new customers is to use the power of the Internet for any companies. Web applications nowadays are very important for any company. Intelligent applications are crucial for the users.

The main goal of our research was to study modern Web technologies to design intelligent Web applications. We focused on developing methods to create intuitively understood applications by the users. We worked with technologies based on Java Script, Dart, node.js, ExpressJS, MongoDB & Backbone.js, Knockout.js, and technologies oriented on Multi-Device Web Development. A brand new W3.CSS technology was in the center of our studies. Lab students played key role in these projects. Results of the investigations conducted together with the students were presented at the DASC 2016 and ICAIT 2016 international conferences.

Computer Security

Semantic analysis of large volumes of Internet packages to detect and classify the potential attacks on the servers on the Internet was in the focus of our study. We utilized the modern technologies to carry out the research. Hadoop environment was among them. Hard work of the lab students resulted in successful presentation of the obtained results at the ICAIT 2016 international forum.

Intelligent Systems and Learning Technologies

Prof. Hamada continued his research on intelligent systems and learning technologies. This year he leads three main projects described as follows.

1. Recommender Systems

Recommender systems are useful in many real life applications in e-business and e-learning. In our recommender systems project we apply machine-learning algorithms, neural networks, and genetic algorithms. We focus on multi-criteria recommender systems. Students are deeply involved in this project. The results were published in international journals such as: Informatica 40(4), International Journal of Simulation Systems, Science & Technology (United Kingdom Simulation Society) 17(35). Results also published in international conferences such as: IEEE ISMS 2016, ICAIT 2016, IEEE TALE 2015, etc.

2. Intelligent Interactive Multimedia Learning Framework

This project focuses on the development of an intelligent interactive multimedia

learning framework. The framework consists of several modules such as: a multimedia content module, a simulation module, etc. The purpose of the project was to support active and collaborative learning. The framework was successfully applied on the topic of information and communication theory. Our framework proves to enhance the learning process and support for self and life-long learning. Students are deeply involved in this project. The results were published in international journals such as: EURASIA Journal of Mathematics, Science and Technology Education (an SSCI Indexed Journal) 13(1) and in international conferences such as: IEEE TALE 2016.

3. Cloud-based Java Compiler for Smart Devices

Smart devices such as iOS-based devices (e.g: iPhone and iPad) and Android-based devices (e.g.: Smartphones and Tablets) become popular among many learners. In this project we utilize such smart powerful devices in the learning process of Java programming. Java is a popular programming language in many computer science educational institutes. Because of some hardware and software limitations of the smart devices, users cannot compile and run Java programs on such devices. The purpose of the project was to build a cloud-based Java compiler that can overcome such limitations and allows the users to run Java programs on the smart devices using the cloud technologies. Results of the project were published on international conferences such as: IEEE ITHET 2016.

Human-Centric Computing

Human-centric technology develops as a substantial part of digital transformation changing the ways people use and advance computer technology. Our current research is focusing on going towards building the systems assuring better user collaboration and leveraging user skills and practices in the areas of developing information systems for travelers, learning systems, as well as advancing our understanding of software construction as a product of human creativity. We presented our project in some international conferences including FedCSIS-2016 (Gdansk, Poland) and SSCI-2016 (Athens, Greece).

Software Engineering

In the domain of software engineering, our particular interests are in advancing approaches for software testing and learning interdisciplinary connections in software design, usage and teaching. A number of projects in this field is a product of our cooperation with Active Knowledge Lab and with our international partners. Particularly, some our recent projects and research works were presented at the international conferences ACENS-2017 (Sapporo, Japan) and TMPA-2017 (Moscow, Russia).

International Relations

Prof. Hamada was invited professor at the African University of Science and Technology, Abuja, Nigeria during Sept. 2016.

Invited lectures and grants

Prof. Hamada delivered an invited lecture at the African University of Science and Technology, Abuja, Nigeria during his visit in Sept. 2016

International conferences and workshops

Our lab in cooperation with the Active Knowledge Lab organized the 6th International Workshop on Advances in Semantic Information Retrieval as an event of the 2015 Federated Conference on Computer Science and Information Systems (Poland, 2016). We involved in this activity since 2011. This workshop is gained popularity among researchers from Europe, Asia, and America.

We held The 2nd International Conference on Applications in Information Technology. The conference is organized in cooperation with the Active Knowledge Lab.

This event is a place for the first scientific presentations of the best students of the University of Aizu and our partner universities. This conference is a good school for Japanese and foreign students on their way to become scientists. The Conference on Applications in Information Technology discovers new names of the next generation of scientists. This event creates the necessary conditions to keep international scientific contacts at the student level. We do hope, some of students participating in this conference will work in tight cooperation in the future. We welcomed 10 Russian students from our partner universities: Saint-Petersburg State University, Peter the Great Saint-Petersburg State Polytechnic University, and Novosibirsk State University, and from University of Luxembourg. On-line sessions were organized to connect Aizu with Germany, Spain, and Russia. The conference Website is available at: http://kspt.icc.spbstu.ru/conf/icait-2016/.

Exchange of Undergraduate Students

Undergraduate university student Mr. Saito and Mr. Moriymama visited Saint Petersburg State University, Russia in April 2016 and presented his paper at the XLVII Conference on Control Processes and Stability. Our Russian partners covered local expenses during their stay in Saint-Petersburg.

In autumn, we welcomed students of Saint-Petersburg State University Ms. Semenova, Ms. Shirokolobova, Mr. Korelin, and Mr. Postnov, student of the Peter the Great Saint-Petersburg State University Mr. Lezhenin, and Mr. Vasiliev, students of Novosibirsk State University Mr. Abramov and Mr. Zyatkov at our The 2nd International Conference on Applications in Information Technology. Their local expenses during their stay in Aizu were covered by our university.

Foreign Students

Undergraduate student Mr. Qiu Chen from China, enrolled in the SGU program, joined our laboratory.

Achievements

At the AY2016 Degree Conferment Ceremony, for the second time in the history of Software Engineering Lab, master student Mr. Keisuke Kato received the Award of Excellence from the President of the University of Aizu in recognition of superior academic performance and research results. It is become a good tradition that results of the research done by lab students are presented at the high rank conferences. Undergraduate student Mr. Murai presented his paper at ICAIT 2016. A submission by master student Mr. Kato is accepted for presentation at DSC 2017. Mr. Saito will present results of his research at IDAACS 2017 in September 2017.

Other activities

Prof. Hamada and other students of our lab was involved in developing many iOS and Android based Apps. Among such applications is the university of Aizu application, which is now available in Apple App store for free download. The app is an effort to introduce the university of Aizu domestically and internationally as a top global university. Another app is the iAizu app which is an effort to collaborate with Aizuwakamatsu city to promote local community collaboration and introduce Aizu city to the world as a historical Japanese city.

Refereed academic journal

[hamada-310-010-01:2016] Mohamed Hamada and M. Hassan. An Interactive Learning Environment for Information and Communication Theory. *EURASIA Journal of Mathematics, Science and Technology Education*, 13(1):35–59, Jan 2017.

Interactive learning tools are emerging as effective educational materials in the area of computer science and engineering. It is a research domain that is rapidly expanding because of its positive impacts on motivating and improving students performance during the learning process. This paper introduces an interactive learning environment for teaching and learning information and communication theory and related courses. The environment integrates several modules to meet the students different learning styles. It contains a movie-like module, an animated hypertext introductory module that fully explains the fundamental concepts of information and communication theory. Besides those important learning modules, it also contains a self-assessment module that contains a set of interactive tests and examinations. Learners can use the environment as a standalone application or as an applet from within any web browser. Some evaluation experiments and comparative analyses of the results were performed to measure the performance of our environment in the classroom.

[hamada-310-010-02:2016] Mohamed Hassan and Mohamed Hamada. Performance Comparison of Featured Neural Network Trained with Backpropagation and Delta Rule Techniques for Movie Rating Prediction in Multi-criteria Recommender Systems. *Informatica*, 40(4):409–414, 2016.

Recommender systems are software tools that have been widely used to recommend valuable items to users. They have the capacity to support and enhance the quality of decisions people make when finding and se- lecting items online. Such systems work based on which techniques are used to estimate users preferences on potentially new items that might be useful to them. Traditionally, the most common techniques used by many existing recommendation systems are collaborative filtering, content-based, knowledge-based and a hybrid-based which combines two or more techniques in different ways. The multi-criteria recommenda- tion technique is a new technique used to recommend items to users based on ratings given to multiple attributes of items. This technique has been used and proven by researchers in industries and academic institutions to provide more accurate predictions than traditional techniques. However, what is still not yet clear is the role of some machine learning algorithms such as the

artificial neural network to improve its prediction accuracy. This paper proposed using a feedforward neural network to model user preferences in multi-criteria recommender systems. The operational results of experiments for training and testing the network using two training algorithms and Yahoo!Movie dataset are also presented.

[hamada-310-010-03:2016] Mohamed Hassan and Mohamed Hamada. A Framework for Recommending Learning Peers to Support Collaborative Learning on a Social Network. *International Journal of Simulation Systems, Science and Technology*, 17(35):30–43, 2016.

With advances in social network sites and easy access to Internet services, many learners rely on suggestions from other people on the Internet for easy access to very essential information concerning learning materials, and also to collaborate with each other in order to exchange ideas. Current recommender systems for learning focus mainly on recommending a sequence of learning materials based on learners similarities or similarities between the new learning objects and the ones the user is already familiar with in the past. Many learners prefer collaborative learning than learning on their own or in the classroom, but the major difficulty in engaging in an online collaborative learning is how to get suitable collaborating partners (learning peers). This paper proposes a framework for building a recommendation system that can search social network sites to find and recommend learning peers to the user based on their post, comment, and common friends on the social network

[pyshe-310-010-01:2016] Pyshkin E. and Ponomarev M. Mathematical Equation Structural Syntactical Similarity Patterns: A Tree Overlapping Algorithms and Its Evaluation. *Informatica*, 40(4):377–385, 2016.

[pyshe-310-010-02:2016] V. Klyuev E. Pyshkin and A. Vazhenin. Editors' introduction to the special issue on applications in information technology. *Informatica*, 40(4):375–376, 2016.

Editorial

Refereed proceedings of an academic conference

[hamada-310-010-04:2016] Mohamed Hamada and Mohamed Hassan. A Multimedia Learning Environment for Information Theory. In *IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE)*. IEEE, 2016.

Achieving significant learning goals in computer science and engineering courses require practical interaction between course instructor and students, and also within class members through multimedia learning environment. This is because multimedia learning becomes the major pedagogical approach as a result of high advancement and usage of digital technology and virtual communication, especially by the modern day students. Multimedia learning environment is a new and promising research area that is geared towards motivating students to fully concentrate during the learning process. This paper presents a case study of multimedia environment for teaching and learning of information theory and its associated courses. The system integrates, in the form of multimedia, different modules that can deal with students' individual differences and various learning styles. There are modules that are designed in a movie-like structure, and an introductory module that displays an animated hypertext that fully gives the fundamental concept of information theory. Furthermore, there are other modules like self-assessment module for testing and examining the performance of the learner. The result of the experiments conducted using this learning environment to test the effectiveness of the system is presented to ensure improvement in students performance in the classroom and also their motivation toward learning the course.

[hamada-310-010-05:2016] Mohamed Hassan and Mohamed Hamada. Enhancing Learning Object Recommendation Using Multi-Criteria Recommendation Systems. In *IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE)*. IEEE, 2016.

To achieve meaningful learning goals, both pedagogues and tutees need frequent supports on how to obtain relevant materials. Recommendation systems have been proved as important tools that assist learners in getting useful learning objects. Nowadays, various recommendation techniques are used to build a system that can find and suggests learning objects to learners. This paper proposed to use a multi-criteria recommendation technique and aggregation function approach for modeling user preferences on learning objects to improve the quality of recommendations given by the existing traditional recommendation systems. The proposed plan is to develop a neural network model and a hybrid of Genetic and Gradient descent algorithms to train the model using real datasets to learn the behavior of the inputs for accurate predictions of learners preferences.

[hamada-310-010-06:2016] Mohamed Hassan and Mohamed Hamada. Rating prediction operation of multi-criteria recommender systems based on feed-

forward network. In *2nd international conference on Applications in information technology, University of Aizu, Aizuwakamatsu, Japan*, 2016.

Recommender systems are software systems that have been widely used to recommend items to the user. They have the capacity to support and enhance the quality of decisions people make when finding selecting items online. The most common techniques used by many recommendation systems are collaborative filtering, content-based, knowledge-based and hybrid-based which combines two or more techniques to make predictions and recommendations. Multi-criteria recommendation technique is a new tech- nique used to recommend items to users based on multi- ple attributes of items. This technique has been used and proven by researchers in industries and academic institutions to provide more accurate predictions and recommendations than the traditional techniques. What is still not yet clear is the role of some machine learning algorithms such as ar- tificial neural network to improve its prediction accuracy. This paper proposed using feedforward neural network to model user preferences in multi-criteria recommender sys- tems. The operational results of experiments for training and testing the network using two training algorithms and yahoo movie data sets are also presented

[hamada-310-010-07:2016] Mohamed Hamada and Tanko Yahaya. A Cloud-based Java Compiler for Smart Devices. In *IEEE International Conference on Information Technology Based Higher Education and Training*. IEEE, 2016.

A Cloud-based Java Compiler for Smart Devices is introduced and its use in context is given.

[hamada-310-010-08:2016] Mohamed Hamada and Mubaraka Sani. Adaptive Learning Framework. In *IEEE International Conference on Information Technology Based Higher Education and Training (ITHET)*, 2016.

An adaptive learning framework was introduced and its components is defined and explained.

[hamada-310-010-09:2016] Mohamed Hassan and Mohamed Hamada. Recommending Learning Peers for Collaborative Learning Through Social Network Sites. In *7TH IEEE International Conference on Intelligent Systems, Modeling and Simulation (ISMS)*. IEEE, 2016.

With advances in social network sites and easy access to internet services, many learners depend on sug- gestions from other people on the internet for easy access to very essential information concerning learning materials, and also to

collaborate with each other in order to exchange ideas. Current recommender systems for learning focus on recommending a sequence of learning materials based on learners similarities or similarities between the new learning objects and the ones the user is already familiar with in the past. Many learners prefer collaborative learning than learning on their own or in the classroom, but the major difficulty in engaging in an online collaborative learning is how to get a suitable collaborating partners(learning peers). This paper proposed a recommendation system that can search social network sites to find and recommend learning peers to the user based on their post, comment, and common friends on the social network.

[pyshe-310-010-03:2016] Pyshkin E. Interdisciplinary Connections of Software Development Education. In *2017 Asian Conference on Engineering and Natural Sciences (ACENS-2017)*, pages 455–461. ACENS, Jan 2017.

[pyshe-310-010-04:2016] Pyshkin E. and Pyshkin M. Toward Better Requirement Definition for Multimedia Travel Guiding Applications. In *2016 IEEE Symposium Series on Computational Intelligence (SSCI 2016)*, pages 1–7. IEEE, Dec 2016.

[pyshe-310-010-05:2016] Chisler A. Pyshkin E., Mozgovoy M. and Volkova Yu. Striving with Online Addiction with a Self-Control Chrome Extension. In *2016 IEEE Symposium Series on Computational Intelligence (SSCI 2016)*. IEEE, Dec 2016.

[pyshe-310-010-06:2016] Volkova Yu. Chisler A. and Pyshkin E. Handle with IT Addiction: A Browser Extension for Overcoming Excessive TV-Series Streaming. In *CEE-SECR '16*. ACM, 2016.

Article 2, 5 pages

[pyshe-310-010-07:2016] M. Ponomarev and E. Pyshkin. Adopting tree overlapping algorithm for MathML equation structural similarity evaluation. In V. Klyuev E. Pyshkin and A. Vazhenin, editors, *Proceedings of 2nd International Conference on Applications in Information Technology (ICAIT-2016)*, pages 17–20. The University of Aizu Press, 2016.

[pyshe-310-010-08:2016] B. Skripal and E. Pyshkin. Using Ant Colony Optimization for tourist route construction automation. In V. Klyuev E. Pyshkin and A. Vazhenin, editors, *Proceedings of 2nd International Conference on Applications in Information Technology (ICAIT-2016)*, pages 103–105. The University of Aizu Press, 2016.

[pyshe-310-010-09:2016] A. Chisler E. Pyshkin, A. Baratynskiy and B. Skripal. Information management for travelers: Towards better route and leisure suggestion. In L. Maciaszek M. Ganzha and M. Paprzycki, editors, *Proceedings of 2016 Federated Conference on Computer Science and Information Systems. ACSIS*, volume 8, pages 429–438. IEEE, 2016.

[pyshe-310-010-10:2016] E. Khramtsova and E. Pyshkin. Software implementation of promotional code based conversion tracking in Internet marketing. In *proceedings of the 9th International Conference on Ubi-Media Computing (U-MEDIA 2016)*, pages 172–177, 2016.

ISBN: 978-5-88835-045-4

[pyshe-310-010-11:2016] E. Pyshkin. Interdisciplinary connections of software development education. In *2017 Asian Conference on Engineering and Natural Sciences (ACENS 2017)*, pages 455–461, 2017.

ISBN 978-986-5654-18-4

[pyshe-310-010-12:2016] M. Mozgovoy and E. Pyshkin. Unity application testing automation with Appium and image recognition. In A. Scedrov V. Itsykson and V. Zakharov, editors, *4th International Conference on Tools and Methods of Program Analysis (TMPA-2017)*, volume 779, pages 139–150. Springer, Cham, 2017.

Communications in Computer and Information Science

[pyshe-310-010-13:2016] E. Pyshkin. Designing human-centric applications: Transdisciplinary connections with examples. In *Proceedings of 2017 3rd International Conference on Cybernetics (CYBCONF)*, pages 455–460. IEEE, 2017.

ISBN: 978-1-5386-2201-8

[pyshe-310-010-14:2016] E. Pyshkin and P. Korobenin. Just walk: Rethinking use cases in mobile audio travel guides. In *Proceedings of the 2017 Federated Conference on Computer Science and Information Systems*, volume 11, pages 281–287. IEEE, 2017.

[pyshe-310-010-15:2016] N. Bogach E. Boitsova I. Lezhenin, A. Zhuikov and E. Pyshkin. PitchKeywordExtractor: Prosody-based Automatic Keyword Extraction for Speech Content. In L. Maciaszek M. Ganzha and M. Paprzycki, editors, *Proceedings of the 2017 Federated Conference on*

Computer Science and Information Systems, volume 11, pages 265–269. IEEE, 2017.

[pyshe-310-010-16:2016] E. Pyshkin. Liberal arts in a digitally transformed world: Revisiting a case of software development education. In *Proceedings of the 13th Central and Eastern European Software Engineering Conference in Russia (CEE-SECR '17)*. ACM, 2017.

Article 23, 7 pages. Best paper in educational field

[pyshe-310-010-17:2016] M. Mozgovoy and E. Pyshkin. Using image recognition for testing hand-drawn graphic user interfaces. In *11th International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies (UBICOMM 2017)*, pages 25–28. IARIA, IARIA, 2017.

Best paper

[vkluev-310-010-01:2016] Saito Y. and Klyuev V. Accessing personal data on android devices. In *Proc. of XLVII Conference on Control Processes and Stability (CPS'16)*, pages 583–590. Saint-Petersburg State University, Saint-Petersburg State University, April 2016.

In the Android security mechanisms, a weakness of the ContentProvider was found. The ContentProvider is a system to share the data among other applications. This weakness may result in the leakage of personal information. The AndroidManifest.xml file is prepared by the developer to set up the application. Preventing the leakage of personal data is very important. We propose a possible solution by setting up this file appropriately. We developed 2 applications: normal one and malicious one, to illustrate our approach by observing different states. This paper discusses this implementation in full details.

[vkluev-310-010-02:2016] Maxim Mozgovoy Marina Purgina and Vitaly Klyuev. Developing a Mobile System for Natural Language Grammar Acquisition. In *In Proc. of 2016 IEEE 14th Intl Conf on Dependable, Autonomic and Secure Computing, 14th Intl Conf on Pervasive Intelligence and Computing, 2nd Intl Conf on Big Data Intelligence and Computing and Cyber Science and Technology Congress(DASC/PiCom/DataCom/CyberSciTech)*, pages 322–325. IEEE, IEEE, August 2016.

The architectural and user interface patterns of mobile applications are well established for most popular software types. However, it is still challenging to design a mobile application for a use scenario beyond typical daily tasks. In

this paper, we describe the challenges and design decision of mobile WordBricks software: a virtual lab-like environment for natural language grammar acquisition. The flexibility of natural language grammar and complexity of visual representation of syntactical word relationships as well as specific pedagogical requirements required flexible system design decisions. We base the system on a combination of dynamic GUI elements creation and XML description of graphical scene contents. The system was successfully tested in a real classroom environment, and proved demonstrated high flexibility and maintainability.

[vkluev-310-010-03:2016] Kentaro Murai and Vitaly Klyuev. Comparison of Bootstrap and W3.CSS. In Vitaly Klyuev Evgeny Pyshkin and Alexander Vazhenin, editors, *Proceedings of the 2nd International Conference on Applications in Information Technology (ICAIT-2016)*, pages 60–63. The University of Aizu, The University of Aizu Press, October 2016.

Nowadays, there are many device categories used to browse webpages on the Internet. Desktops, laptops, computers, smartphones, and tablets are known examples. Usage of mobile devices drastically changed requirements for the website development. A webpage that can provide an appropriate layout and content for visitors is needed. Bootstrap and W3.CSS are frameworks for modern website development. In this research, we characterize these two frameworks and compare their functionalities.

[vkluev-310-010-04:2016] Keisuke Kato and Vitaly Klyuev. Hadoop Environment for the Analysis of Large Network Packets. In Vitaly Klyuev Evgeny Pyshkin and Alexander Vazhenin, editors, *Proceedings of the 2nd International Conference on Applications in Information Technology(ICAIT-2016)*, pages 56–59. The University of Aizu, The University of Aizu Press, October 2016.

We presented how to analyze the huge size of pcap

les on Hadoop and visualize the analysis results on the web browser by using Hadoop User Experience (Hue).

Academic society activities

[hamada-310-010-10:2016] Mohamed Hamada, 2016.

Senior member

[hamada-310-010-11:2016] Mohamed Hamada, 2016.

Senior member

[vkluev-310-010-05:2016] Vitaly Klyuev, 2016.

Memeber

Advisor for undergraduate research and graduate research

[hamada-310-010-12:2016] Hirofumi Shishido. Nifty based App for U-Aizu, UoA, 2016.

[hamada-310-010-13:2016] Ryosuke Omori. An Android-based App for U-Aizu, UoA, 2016.

[hamada-310-010-14:2016] Nozomi Kozawa. A new iOS-based Application for i-Aizu, UoA, 2016.

[hamada-310-010-15:2016] Suisei Hara. Android-based iAizu Application, UoA, 2016.

[vkluev-310-010-06:2016] Keisuke Kato. Master Thesis: Development of a Network Intrusion Detection System Using Apache Hadoop and Spark, Graduate School, February 2017.

[vkluev-310-010-07:2016] Kentaro Murai. Graduation Thesis: Responsive Website Development: Comparison of Bootstrap and W3.CSS, Undergraduate School, February 2017.

[vkluev-310-010-08:2016] Yoichi Saito. Graduation thesis: Opinion Mining: Book-Ranking Application, Undergraduate School, February 2017.

Contributions related to syllabus preparation

[hamada-310-010-16:2016] Preparation for Automata Theory course syllabus

[hamada-310-010-17:2016] Preparation for Information Theory course Syllabus

[hamada-310-010-18:2016] Preparation for Language Processing course Syllabus

[hamada-310-010-19:2016] Participated in Preparation for Java Programming 1 course Syllabus

[hamada-310-010-20:2016] Preparation for Computational models course Syllabus

[hamada-310-010-21:2016] Preparation for Automata and Languages course Syllabus

Preparation of course examination to measure comprehension

[hamada-310-010-22:2016] Preparation for course examination for Information Theory course

[hamada-310-010-23:2016] Preparation for course examination of Automata Theory course

[hamada-310-010-24:2016] Preparation for course examination of Automata and languages course

[hamada-310-010-25:2016] Participated in Preparation for course examination of Java programming 1 course

Scholarly paper prepared by undergraduate/graduate student(s) you advised

[hamada-310-010-26:2016] Mohamed Hamada and Mohamed Hassan. An Interactive Learning Environment for Information and Communication Theory. *EURASIA Journal of Mathematics, Science and Technology Education*, 2016.

[hamada-310-010-27:2016] Mohamed Hassan and Mohamed Hamada. Performance Comparison of Featured Neural Network Trained with Backpropagation and Delta Rule Techniques for Movie Rating Prediction in Multi-criteria Recommender Systems. *Informatica*, 2016.

[hamada-310-010-28:2016] Mohamed Hassan and Mohamed Hamada. A Framework for Recommending Learning Peers to Support Collaborative Learning on a Social Network. *International Journal of Simulation Systems, Science and Technology*, 2016.

[hamada-310-010-29:2016] Mohamed Hamada and Mohamed Hassan. A Multimedia Learning Environment for Information Theory. *IEEE International Conference on Teaching, Assessment, and Learning for Engineering*, 2016.

[hamada-310-010-30:2016] Mohamed Hassan and Mohamed Hamada. Enhancing Learning Object Recommendation Using Multi-Criteria Recommendation Systems. *IEEE International Conference on Teaching, Assessment, and Learning for Engineering*, 2016.

[hamada-310-010-31:2016] Mohamed Hassan and Mohamed Hamada. Rating prediction operation of multi-criteria recommender systems based on feedforward network. *2nd international conference on Applications in information technology, University of Aizu*, 2016.

[hamada-310-010-32:2016] Mohamed Hassan and Mohamed Hamada. Recommending Learning Peers for Collaborative Learning Through Social Network Sites. *7TH IEEE International Conference on Intelligent Systems, Modeling and Simulation*, 2016.

[vkluev-310-010-09:2016] Saito Y. and Klyuev V. Accessing personal data on android devices. *Proc. of XLVII Conference on Control Processes and Stability (CPS'16)*, pages 583–590, April 2016.

[vkluev-310-010-10:2016] Maxim Mozgovoy Marina Purgina and Vitaly Klyuev. Developing a Mobile System for Natural Language Grammar Acquisition. *Proc. of 2016 IEEE 14th Intl Conf on Dependable, Autonomic and Secure Computing, 14th Intl Conf on Pervasive Intelligence and Computing, 2nd Intl Conf on Big Data Intelligence and Computing and Cyber Science and Technology Congress(DASC/PiCom/DataCom/CyberSciTech)*, pages 322–325, August 2016.

[vkluev-310-010-11:2016] Kentaro Murai and Vitaly Klyuev. Comparison of Bootstrap and W3.CSS. *Proceedings of the 2nd International Conference on Applications in Information Technology (ICAIT-2016)*, pages 60–63, October 2016.

[vkluev-310-010-12:2016] Keisuke Kato and Vitaly Klyuev. Hadoop Environment for the Analysis of Large Network Packets. *Proceedings of the 2nd International Conference on Applications in Information Technology (ICAIT-2016)*, pages 56–59, October 2016.

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

[hamada-310-010-33:2016] Public lecture on iOS Program Development as a try-series

[hamada-310-010-34:2016] Developing iOS-based App for the University of Aizu as an effort to promote the university of Aizu both nationally and internationally

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

[hamada-310-010-35:2016] Track chair and PC member of International Conference on Computational Science

[hamada-310-010-36:2016] Publicity chair of the IEEE International Conference on Information Technology Based Higher Education and Training ITHET

[hamada-310-010-37:2016] Advisory board of the IEEE International Conference on Internet of Things and Smart Innovations

[hamada-310-010-38:2016] Guest Researcher at the University of Tsukuba, Alliance for Research on North African, ARENA Center, Tsukuba Science City, Japan

[hamada-310-010-39:2016] Visiting Professor at the African University of Science and Technology, Abuja, Nigeria

Other significant contribution toward university planning, management, or administration

[hamada-310-010-40:2016] Creating programming problems for the PC-Koshien

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

[hamada-310-010-41:2016] Giving public lectures on smartphone application development