

Software Engineering Laboratory



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The main directions in research conducted by the Software Engineering Lab members in 2017 were

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

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, Human-Centric Computing, and Software Development Education Methodology.

Semantic Methods for Information Retrieval

In 2016, the attention to the fake news phenomenon drastically increased. Mobile devices such as cellular phones and sources of information such as social networks are instruments that enable individuals to receive news, publish posts, communicate with peers, watch videos, listen to music, etc. In today's highly mobile society, this is a current trend. The uncontrolled freedom and simplicity in publications on the Internet result in overwhelming users receiving news that are fake and hoaxes. Detecting and filtering such information is a challenging problem. The focus of this year's study was on different approaches to combat fake news.

They are used to a) determine text features utilizing linguistic natural language processing methods (it is necessary to create a profile of the text document), b) detect spam bots in social networks to isolate those using machine-learning methods (it is crucial to reduce the number of analyzed documents), and c) confirm the facts in online documents by applying techniques used in search engines (it is very much important to select trusted documents). Opinion mining methods for Japanese were investigated and a prototype to analyze and classify opinions on Amazon.co.jp was developed. Our students were involved in this research. Results were presented at the IDAACS-17 and CPS-18 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 enhance the Lab Website. Lab students played key role in these projects. Results of the investigations conducted together with the students were presented at the ICEEL 2018 and CPS '18 international conferences.

Computer Security

A big problem for security is detection of vulnerabilities on the networks. Mobile devices such as tablet PCs and mobile phones are gained popularity across the globe. Modern mobile phones are small computers called smartphones. Practically information of any kind about every person can be obtained if one knows his/her phone number: routes to move, places to eat, time to wake up and go to bed, friends, and even habits. There is no place to hide for the users. Recently, it was discovered that mobile devices from several manufactures have factory-preinstall malware. Defending the user data become more complicated. 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 DSC-17 and CPS-18 international forums.

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. Results also published in in the proceedings of several international conferences.

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.

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.

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. A particularly interesting aspect of human-centric technology is its transdisciplinarity, which is twofold: first, it means a cooperation among algorithms, methodologies and approaches from different knowledge areas struggling with a certain societal problem or applied to a certain technology; second, it is a transition of the successful solutions or applications to a distinct application domain. We presented our ongoing projects in some international conferences including FedCSIS-2017 (Prague, Czech Republic) and CYBCONF 2017 (Exeter, United Kingdom).

Software Engineering and Software Development Education 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 Engineering Lab and with our international partners. Among the scope of our particular interests, there are project on software testing automation (including mobile software testing) and software development learning and teaching methodology, which is a non-trivial topic for IT research. A digitally transformed society requires further transformation of practices and techniques used in teaching and learning organization, including an approach to use metaphors reflecting multi-faceted software concepts. Software development education is a natural convergence of many interdisciplinary efforts. Teaching and learning software development requires creating a context, where a software-related expertise interacts with and even penetrates a wide range of technical and non-technical academic disciplines. Particularly, some our recent projects and research works were presented at the international conferences including ACENS-2017 (Sapporo, Japan), SECR 2017, UBICOMM 2017 (Barcelona, Spain). The presentation made at SECR 2017 by Prof. Pyshkin was awarded as the best paper in the educational field. The paper (in co-authorship with Prof. Mozgovoy) for UBICOMM 2017 presented by Prof. Pyshkin received the best paper award.

International Relations Our international contacts helps us to organize the international workshops and conferences, to share our research and education expertise, and to involve excellent experts to join our ongoing projects. List of our international partners includes professionals from many authoritative institutions including the University of Luxembourg (Luxembourg), Universitat Politècnica de València (Spain), Ulm University of Applied Sciences (Germany), Meiji University (Japan), St. Petersburg State University (Russia), Peter the Great St. Petersburg Polytechnic University (Russia), Belarussian Russian University (Belarus), T-Systems Rus (Russia), and Cognizant Consulting (Switzerland). Opportunities to participate in international academic projects significantly extends the possibilities to approve the ideas and teaching models, to get feedback from the international community, and therefore, to improve the courses developed for the University of Aizu students.

Invited lectures and grants

Prof. Pyshkin was invited for a keynote presentation *Software through the Perspective of Human-Centric Computing Paradigm* the NexTech 2017 conference series (November 12 – 16, 2017, Barcelona, Spain). In September 2017, Prof. Pyshkin delivered a series of guest lectures *Software Engineering for the Digitally Transformed World* in Belarussian Russian University, Mogilev, Belarus. In November 2017 and in March 2018 Prof. Pyshkin gave an open lecture *Human-*

Centric Computing in a Transdisciplinary Research Discourse and a number of seminars for master-degree students and faculty *Software Engineering for the Digitally Transformed World: Improve Your Learning Abilities, The University of Aizu: No. 1 Japanese University in International Outlook, Quality Assurance: Software Evaluation vs. Quality Methods Evaluation.*

International conferences and workshops

Our lab in cooperation with the Active Knowledge Lab organized the 7th International Workshop on Advances in Semantic Information Retrieval as an event of the 2017 Federated Conference on Computer Science and Information Systems (Prague, Czech Republic, 2017). We involved in this activity since 2011. This workshop is gained popularity among researchers from Europe, Asia, and America. The Website is available at: <https://fedcsis.org/2017/asir/>.

Our proposal for a special session on Information Management in Human-Centric Systems (IMHCS-2017) was accepted to be organized as an event of CYBCONF 2017 conference (Exeter, United Kingdom). Prof. Pyshkin and Prof. Klyuev were co-chairs of this session. The event was successfully implemented in June 2017 and attracted the research works discussing current trends in information acquisition, representation and processing in human-centric systems and applications. Experts from the universities and IT companies from 8 countries (including Japan, Russia, Luxembourg, Germany, Spain, Norway, Switzerland and Italy) joined the program committee of this event. The workshop materials including selected works on human-centered applications were published in the conference proceedings published by IEEE Computer Society Press and subsequently indexed by Web of Knowledge and Scopus.

We have started work to organize The 3rd International Conference on Applications in Information Technology. The conference is organized in cooperation with the Active Knowledge Lab and our partner university Peter the Great Saint-Petersburg State Polytechnic University, Russia. In the end of Spring 2018, this conference received the status: ICPS published by ACM.

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. The conference Website is available at: <http://icaait-aizu.org/>

Exchange of Undergraduate Students

For the first time in the history of our lab, submissions of four undergraduate university students: Mr. Kamia, Mr. Nemoto, Mr. Kito, and Mr. Qiu Chen, were accepted for presentation at the XLIX Conference on Control Processes and Stability (<http://cpsconf.ru>). Our Russian partners are in charge for local expenses during students stay in Saint-Petersburg. Russian students will attend ICAIT-2018 in Aizu in November 2018.

Foreign Students Undergraduate student Mr. Qiu Chen from China, enrolled in the SGU program, should be graduated in Autumn 2018.

Achievements

It is become a good tradition that results of the research done by lab students are presented at the high rank conferences. Mr. Saito successfully presented results of his research at IDAACS 2017 in September 2017. Submissions by undergraduate students Mr. Kamia, Mr. Nemoto, Mr. Kito, and Mr. Qiu Chen were accepted for CPS '18 international forum. A paper by master student Mr. Kato was presented at DSC 2017 (Taiwan, August, 2017). Conference organizers recommended its extended version for publication in the Special Issue on Multidisciplinary Sciences and Engineering organized by Advances in Science, Technology and Engineering Systems Journal (ASTESJ).

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.

In April 2017 we started the project *Advancing interfaces, ontologies and algorithms for traveler-centric information systems supporting geographical, cultural and historical perspectives* supported by the JSPS Kakenhi grant. This 3 years project involves researchers and students from Software Engineering Lab, Active Knowledge Engineering Lab, as well as our academic and industrial international partners from Peter the Great St. Petersburg Polytechnic University and T-Systems Rus. The project follows a process of evolution of models and technology for developing software for personalized travel information services. This research will produce a number of models and software prototypes for interfaces and algorithms used in travel-centric information systems.

One more interlab project running because of collaboration with Active Knowledge Engineering Lab (Prof. Maxim Mozgovoy) is developing a conceptual architecture and a framework for mobile software automated testing, which is one of

the most cost-efficient quality assurance procedures. Our goal is to create an open source framework for small-scale mobile farms. The aim of this framework is to let anyone to quickly connect own iOS or Android devices into a fully functional mobile farm, and integrate it into existing continuous integration pipeline.

Refereed academic journal

- [hamada-310-010-01:2017] Mohamed Hamada and Mohamed Hassan. An Enhanced Learning Style Index: Implementation and Integration into an Intelligent and Adaptive e-Learning System. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(8):4449–4470, 2017.

Advances and accessibility of Internet services around the world have transformed the traditional classroom learning into web-based e-learning systems. In recent years, designing adaptive e-learning systems has become one of striking topic of discussions in the literature. Additionally, integrating such systems with intelligent and adaptive systems that can measure the learning preferences of the user can enable learners to obtain the most suitable learning objects that might be matched with their learning styles. Moreover, even in the classroom teaching, knowing the learning styles of students can also help teachers to adopt appropriate learning materials for efficient learning. This paper is concerned with the study, implementation, and application of a web-based learning style index. The paper also described a case study on the integration of the learning style index into an adaptive and intelligent e-learning system.

- [hamada-310-010-02:2017] Hamada M. Hassan, M. A neural networks approach for improving the accuracy of multi-criteria recommender systems. *Applied Sciences*, 7(9):1–18, 2017.

Accuracy improvement has been one of the most outstanding issues in the recommender systems research community. Recently, multi-criteria recommender systems that use multiple criteria ratings to estimate overall rating have been receiving considerable attention within the recommender systems research domain. This paper proposes a neural network model for improving the prediction accuracy of multi-criteria recommender systems. The neural network was trained using simulated annealing algorithms and integrated with two samples of single-rating recommender systems. The paper presents the experimental results for each of the two single-rating techniques together with their corresponding neural network-based models. To analyze the performance of the approach, we carried out a comparative analysis of the performance of each single rating-based technique and the proposed multi-criteria model. The experimental findings revealed that the proposed models have by far outperformed the existing techniques.

- [hamada-310-010-03:2017] Hamada M. Hassan, M. Performance comparison of

feed-forward neural networks trained with different learning algorithms for recommender systems. *Computation*, 5(3):40–58, 2017.

Accuracy improvement is among the primary key research focuses in the area of recommender systems. Traditionally, recommender systems work on two sets of entities, Users and Items, to estimate a single rating that represents a users acceptance of an item. This technique was later extended to multi-criteria recommender systems that use an overall rating from multi-criteria ratings to estimate the degree of acceptance by users for items. The primary concern that is still open to the recommender systems community is to find suitable optimization algorithms that can explore the relationships between multiple ratings to compute an overall rating. One of the approaches for doing this is to assume that the overall rating as an aggregation of multiple criteria ratings. Given this assumption, this paper proposed using feed-forward neural networks to predict the overall rating. Five powerful training algorithms have been tested, and the results of their performance are analyzed and presented in this paper.

Refereed proceedings of an academic conference

[hamada-310-010-04:2017] Hamada M. Hassan, M. Smart media-based context-aware recommender systems for learning: A conceptual framework. In *IEEE 16th International Conference on Information Technology Based Higher Education and Training, ITHET 2017*. IEEE, 2017.

Modern technologies have been greatly employed to support both teachers and learners for facilitating teaching and learning processes. Recommender systems for technology- enhanced learning (TEL) are among those new technologies that have been researched extensively within the past few years. This is because, recommender systems are intelligent decision support systems that assist users in finding suitable learning objects that might match their preferences on the kinds of materials they require to enhance their learning process. However, most of the existing recommender systems for learning used traditional techniques to recommend items without considering the context for which the recommendation should be made. Those contexts could be their geographical locations, their level of education, the time of the day or week, their learning preferences and so on. This paper proposed a smart media-based context-aware recommender system that considers learning preferences of a user as a context for making accurate and usable recommendations. The proposed system is designed to run on smart devices for learners to test and know their learning styles and receive

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learning object recommendations according to their learning preferences. The paper contains the conceptualization of the framework and the details of the design and implementation procedure.

[hamada-310-010-05:2017] Hamada M. Hassan, M. Performance analysis of neural networks-based multi-criteria recommender systems. In *IEEE International Conferences on Information Technology, Information Systems and Electrical Engineering, ICITISEE 2017*. IEEE, 2017.

Frequent use of Internet applications and rapid growth of volumes of online resources have made it difficult for users to effectively make decisions on the kinds of information or items to select. Recommender systems (RSs) are intelligent decision-support tools that exploit users preferences and suggest items that might be interesting to them. They are one of the various solutions used by online users to overcome the problem of information overload. Traditionally, RSs use single ratings to predict and represent preferences of users for items that are not yet seen. Multi-criteria RSs use multiple ratings to various items' attributes for improving prediction and recommendation accuracy of the systems. However, one major challenge of multi-criteria RSs is the choice of an efficient approach for modelling the criteria ratings. Therefore, this paper aimed at employing artificial neural networks to model the criteria ratings and determine the predictive performance of the systems based on aggregation function approach. Seven evaluation metrics have been used to evaluate and the accuracy of the systems. The empirical results of the study have shown that the proposed technique has the highest prediction and recommendation than the corresponding traditional technique.

[hamada-310-010-06:2017] Hamada M. Hassan, M. Improving prediction accuracy of multi-criteria recommender systems using adaptive genetic algorithms. In *IEEE Intelligent Systems Conference, IntelliSys 2017*. IEEE, 2017.

Recommender systems are powerful intelligent systems that are considered as solutions to the problems of information overload. They provide personalized lists of recommended items to users using some machine learning techniques. Traditionally, the existing recommender systems used single rating techniques to estimate users opinions on items. However, as preferences of the users might depend on several items attributes, the efficiency of the traditional single rating recommender systems are considered to be limited since it can not account for the various items attributes. A multi-criteria recommendation is a new technique that uses ratings to various items attributes to make more efficient predictions. Nevertheless, despite the proven accuracy improvements

of multi-criteria recommendation technique, research needs to be done continuously to establish an efficient way of modelling the criteria ratings. Therefore, this paper proposed to use an adaptive genetic algorithm to model multi-criteria recommendation problems using an aggregation function approach. The empirical results presented in this paper have shown that the multi-criteria recommendation technique using adaptive genetic algorithm has by far provides more accurate predictions than traditional recommendation approach.

[hamada-310-010-07:2017] Hamada M. Hassan, M. A computational model for improving the accuracy of multi-criteria recommender systems IEEE 11th International Symposium on Embedded Multicore/Many-Core Systems-on-Chip, MCSoc 2017. In *IEEE 11th International Symposium on Embedded Multicore/Many-Core Systems-on-Chip, MCSoc 2017*, page 2017. IEEE, 2017.

Artificial neural networks are complex biologically inspired algorithms made up of highly distributed, adaptive and self-organizing structures that make them suitable for optimization problems. They are made up of a group of interconnected nodes, similar to the great networks of neurons in the human brain. So far, artificial neural networks have not been applied to user modeling in multi-criteria recommender systems. This paper presents neural networks-based user modeling technique that exploits some of the characteristics of biological neurons for improving the accuracy of multi-criteria recommendations. The study was based upon the aggregation function approach that computes the overall rating as a function of the criteria ratings. The proposed technique was evaluated using different evaluation metrics, and the empirical results of the experiments were compared with that of the single rating-based collaborative filtering and two other similarity-based modeling approaches. The two similarity-based techniques used are: the worst-case and the average similarity techniques. The results of the comparative analysis have shown that the proposed technique is more efficient than the two similarity-based techniques and the single rating collaborative filtering technique.

[hamada-310-010-08:2017] Hamada M. Adeshina S.A. Enegi, I.L. Adaptive multimedia learning framework with facial recognition system. In *13th IEEE International Conference on Electronics, Computer and Computation, ICECCO 2017*. IEEE, 2017.

Recent breakthrough in mobile technology, wireless communication and sensing ability of smart devices promote the ease to detect real-world learning status of students as well as the context aware for learning. Targeted information can

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be provided to individual students in the right place and at the right time. This work is one of the three major components of our Smart Learning Framework, others include Multimedia Module Contents (MMC) and Learning Style Index (LSI). However, this module of our work aimed to perfect efforts to correctly make decision during and educational learning process. This was based on the fact that adaptive decisions can only be made to protect learner enthusiasm, promote learning grid and enhances general understanding of an adaptive learning environment if users immediate behavior and concern is well considered. This approach implements facial expres- sion recognition on a smart phone (android) using efectiva SDK. This enables correct detection of facial expression for further understanding of the meaning in a learning environment. The output of this module is used for Learners Behavior Analysis which then provide result of general evaluation of individual learner.

[pyshe-310-010-01:2017] Mozgovoy M. and Pyshkin E. Unity application testing automation with Appium and image recognition. In Itsykson V., Scedrov A., and Zakharov V., editors, *Tools and Methods of Program Analysis. TMPA 2017.*, volume 779 of *Communications in Computer and Information Science*, pages 139–150. Springer, Cham, 2017.

The paper was presented at the TMPA-2017, an authoritative conference in the domain of software verification and analysis.

[pyshe-310-010-02:2017] Pyshkin E. Designing Human-Centric Applications: Transdisciplinary Connections with Examples. In *Proc. of 2017 3rd IEEE International Conference on Cybernetics (CYBCONF), Exeter, UK, Jun 21-23*, pages 455–460. IEEE, IEEE, 2017.

This presentation was delivered at the special session on Information Management in Human-Centric Systems, organized in conjunction with the 3rd IEEE CybConf 2017 conference.

[pyshe-310-010-03:2017] Pyshkin E. and Korobenin P. Just Walk: Rethinking Use Cases in Mobile Audio Travel Guides. In Ganzha M., Maciaszek L., and Paprzycki M., editors, *Proceedings of the 2017 Federated Conference on Computer Science and Information. ACSIS*, volume 11, pages 281–287. IEEE, 2017.

Presented at the Advances in Semantic Information Retrieval workshop, organized in conjunction with FedCSIS 2017.

[pyshe-310-010-04:2017] Lezhenin I., Zhuikov A., Bogach N., Boitsova E., and

Pyshkin E. PitchKeywordExtractor: Prosody-based Automatic Keyword Extraction for Speech Content. In Ganzha M., Maciaszek L., and Paprzycki M., editors, *Proceedings of the 2017 Federated Conference on Computer Science and Information Systems. ACSIS*, volume 11, pages 265–269. IEEE, 2017.

The paper was presented at the FedCSIS 2017 as the joint project of the University of Aizu and Peter the Great St. Petersburg Polytechnic University supervised by Evgeny Pyshkin.

[pyshe-310-010-05:2017] Pyshkin E. Liberal arts in a digitally transformed world: 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.

Awarded as SECR 2017 Best Paper in the educational field.

[pyshe-310-010-06:2017] Mozgovoy M. and Pyshkin E. Using Image Recognition for Testing Hand-drawn Graphic User Interfaces. In *11th International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies (UBICOMM 2017), November 12-16, Barcelona, Spain*, pages 25–28. IARIA, 2017.

Awarded as UBICOMM-2017 Best Paper.

[vkluev-310-010-01:2017] Keisuke Kato and Vitaly Klyuev. Development of a Network Intrusion Detection System Using Apache Hadoop and Spark. In *Proceedings of the 2017 IEEE Conference on Dependable and Secure Computing (DSC-17)*, pages 416–423. IEEE, IEEE, August 2017.

Cyber attacks on network communication are executed against companies, governments, and even individuals. A number of these attacks is drastically increased over the last decade. Nowadays, protecting private data, latest research data, etc. is a crucial problem. Therefore, developing an intelligent system to detect the attacks is required. In this paper, we propose an anomaly based network intrusion detection system. The system is capable to analyze huge datasets in a short period of time. We utilized 90.9 GB of a real network packet dataset provided by the Information Security Centre of Excellence at the University of New Brunswick. The system analyzes the packet capture files of this dataset in the environment by using Apache Hadoop and Spark. An approach to implement the system is based on Hive SQL and unsupervised learning algorithms. The accuracy of the proposed detection system is 86.2 percent with 13 percent of the false positive rate. These results are promising to detect attacks in real-time.

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[vkluev-310-010-02:2017] Yoichi Saito and Vitaly Klyuev. Opinion Mining: Book-Ranking Application. In *the 2017 IEEE 9th International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS)*, volume 2, pages 767–770. IEEE, IEEE, September 2017.

A lot of products are sold on electronic commerce websites. There are many customer reviews available on the Internet. Users read them to select a product to purchase. However, going through the reviews is timeconsuming because the number of reviews is large for each product. It is important to reflect reviews in a ranking to make a decision easily. The aim of this research is ranking products based on opinions of customers by proposing a new ranking method. We focused on the customer reviews on books. In this research, we collected all reviews on each book and classified them as positive or negative. After that, we calculated the rates of positive sentences and negative ones and made a ranking of books based on them. As a result from the experiment, we got a book ranking list. This ranking strongly depends on the number of customer reviews and their contents. This approach was illustrated reviews on books on Ruby on rails. In the future, we are planning to apply a machine learning algorithm to classify reviews more accurately.

[vkluev-310-010-03:2017] Vitaly Klyuev. TEAM-BASED LEARNING IN COMPUTER SCIENCE: A JAPANESE CASE STUDY. In *International Conference on Education and E-Learning (ICEEL)*, pages 20–22. ISERD, March 2018.

This paper discusses the specifics of team-based learning in computer science at the university in Japan.

Research grants from scientific research funds and public organizations

[pyshe-310-010-07:2017] Pyshkin E. and Mozgovoy M. Advancing interfaces and algorithms used in traveler-centric information systems supporting geographical, cultural and historical perspectives, 2017-2019.

Academic society activities

[hamada-310-010-09:2017] Mohamed Hamada, 2017.

IEEE Senior member

[hamada-310-010-10:2017] Mohamed Hamada, 2017.

ACM Senior member

[vkluev-310-010-04:2017] Vitaly Klyuev, 2017.

member

Advisor for undergraduate research and graduate research

[hamada-310-010-11:2017] Ryo Kuribayashi. Developing mobile application for learning Shannon code algorithm, UoA, 2017.

[hamada-310-010-12:2017] Yuichi Takase. Design and implementation of Huffman code using Android OS, UoA, 2017.

[hamada-310-010-13:2017] Hitoshi Ikuta. Recognition of facial expressions using smartphones, UoA, 2017.

[hamada-310-010-14:2017] Yoshiki Miyazawa. A cloud-based implementation of data compression techniques, UoA, 2017.

[vkluev-310-010-05:2017] Cristian Kamia. Removing pre-installed malware applications from firmware of Android-based smartphones, Undergraduate School, March 2017.

[vkluev-310-010-06:2017] Naoto Sugawara. Principal Component Analysis: Matching Skin Patterns of Fish, Undergraduate School, March 2017.

Contributions related to syllabus preparation

[hamada-310-010-15:2017] Preparation for Automata Theory course syllabus

[hamada-310-010-16:2017] Preparation for Language Processing Systems course Syllabus

[hamada-310-010-17:2017] Preparation for Information Theory course Syllabus

[hamada-310-010-18:2017] Preparation for Computational models course Syllabus

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[hamada-310-010-19:2017] Preparation for Automata and Languages Theory course Syllabus

[pyshe-310-010-08:2017] Preparation of the syllabi for the connected undergraduate courses "Introduction to Programming" and "C programming" within the framework of ICTG program.

[pyshe-310-010-09:2017] Preparation of the syllabus of the undergraduate course "Introduction to Data Management" (launched in AY2018).

Preparation of course examination to measure comprehension

[hamada-310-010-20:2017] Preparation for course examination for Information Theory course

[hamada-310-010-21:2017] Preparation for course examination of Automata Theory course

[hamada-310-010-22:2017] Preparation for course examination of Automata and languages theory course

[hamada-310-010-23:2017] Participated in Preparation for course examination of Java programming 1 course

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

[hamada-310-010-24:2017] Hassan M. Hamada, M. An enhanced learning style index: Implementation and integration into an intelligent and adaptive e-Learning system. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(8), 2017.

[hamada-310-010-25:2017] Hamada M. Hassan, M. A neural networks approach for improving the accuracy of multi-criteria recommender systems. *Applied Sciences*, 7(9), 2017.

[hamada-310-010-26:2017] Hamada M. Hassan, M. Performance comparison of feed-forward neural networks trained with different learning algorithms for recommender systems. *Computation*, 5(3), 2017.

- [hamada-310-010-27:2017] Hamada M. Hassan, M. Smart media-based context-aware recommender systems for learning: A conceptual framework. *16th IEEE International Conference on Information Technology Based Higher Education and Training, ITHET 2017*, 2017.
- [hamada-310-010-28:2017] Hamada M. Hassan, M. Performance analysis of neural networks-based multi-criteria recommender systems. *IEEE International Conferences on Information Technology, Information Systems and Electrical Engineering, ICITISEE 2017*, 2017.
- [hamada-310-010-29:2017] Hamada M. Hassan, M. Improving prediction accuracy of multi-criteria recommender systems using adaptive genetic algorithms. *IEEE Intelligent Systems Conference, IntelliSys 2017*, 2017.
- [hamada-310-010-30:2017] Hamada M. Hassan, M. A computational model for improving the accuracy of multi-criteria recommender systems. *IEEE 11th International Symposium on Embedded Multicore/Many-Core Systems-on-Chip, MCSoc 2017*, 2017.
- [vkluev-310-010-07:2017] Keisuke Kato and Vitaly Klyuev. Development of a Network Intrusion Detection System Using Apache Hadoop and Spark. *The 2017 IEEE Conference on Dependable and Secure Computing (DSC-17)*, pages 416–423, August 2017.
- [vkluev-310-010-08:2017] Vitaly Klyuev Yoichi Saito. Opinion Mining: Book-Ranking Application. *the 2017 IEEE 9th International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS)*, 2:767–770, September 2017.

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

- [hamada-310-010-31:2017] Public lecture on iOS Program Development as a try-series
- [hamada-310-010-32:2017] 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

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[hamada-310-010-33:2017] Guest Researcher at the University of Tsukuba, Alliance for Research on North African, ARENA Center, Tsukuba Science City, Japan

[hamada-310-010-34:2017] Advisor Committee Member for the IEEE IndiaCOM International Conference

[hamada-310-010-35:2017] Associate Editor for AI and New Generation Learning Technologies, The International Journal of Information Technology (Springer).

[hamada-310-010-36:2017] Editorial Board of the International Journal of Computer Science and Artificial Intelligence (IJCSAI).

[hamada-310-010-37:2017] Reviewer of: the IEEE Trans. On Learning Technologies, the ACM Trans. On Computing Education, the IEICE transactions, the Journal of Advances in Modeling and Analysis, the ACM SIGCSE and ITiCSE, IEEE Trans. On Education, Computer Applications in Eng. Education, and others.

[pyshe-310-010-10:2017] As a program committee chair, I was involved to the preparation activities for organizing the ICAIT-2018 conference (to be held in the University of Aizu) include the ACM ICPS conference application procedure (ACM ICPS status has been approved), deploying the conference submission system at EasyChair, designing and administering the conference web page available at <http://icaait-aizu.org>, inviting the PC members and keynote speakers.

[pyshe-310-010-11:2017] I led a special session on Information Managements in Human-Centric Systems organized as an event of 3rd IEEE CybConf 2017 in Exeter, UK, June 2017 (session co-chair). Workshop materials including selected works on human-centered applications were published in the conference proceedings published by IEEE Computer Society Press and subsequently indexed by Web of Knowledge and Scopus. As a program committee co-chair (together with Prof. Vitaly Klyuev), I was responsible for managing the workshop submission system and for coordinating the event in Exeter.

Other significant contribution toward university planning, management, or administration

[hamada-310-010-38:2017] Creating programming problems for the PC-Koshien

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

Summary of Achievement

[hamada-310-010-39:2017] Actively participated in faculty development invited lectures.

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

[hamada-310-010-40:2017] Giving public lectures on smartphone application development

[pyshe-310-010-12:2017] I coordinated the OpenCampus activities in the Software Engineering Lab during October 2017 Open Campus event. The presentation on ongoing lab projects were delivered to the lab guests.