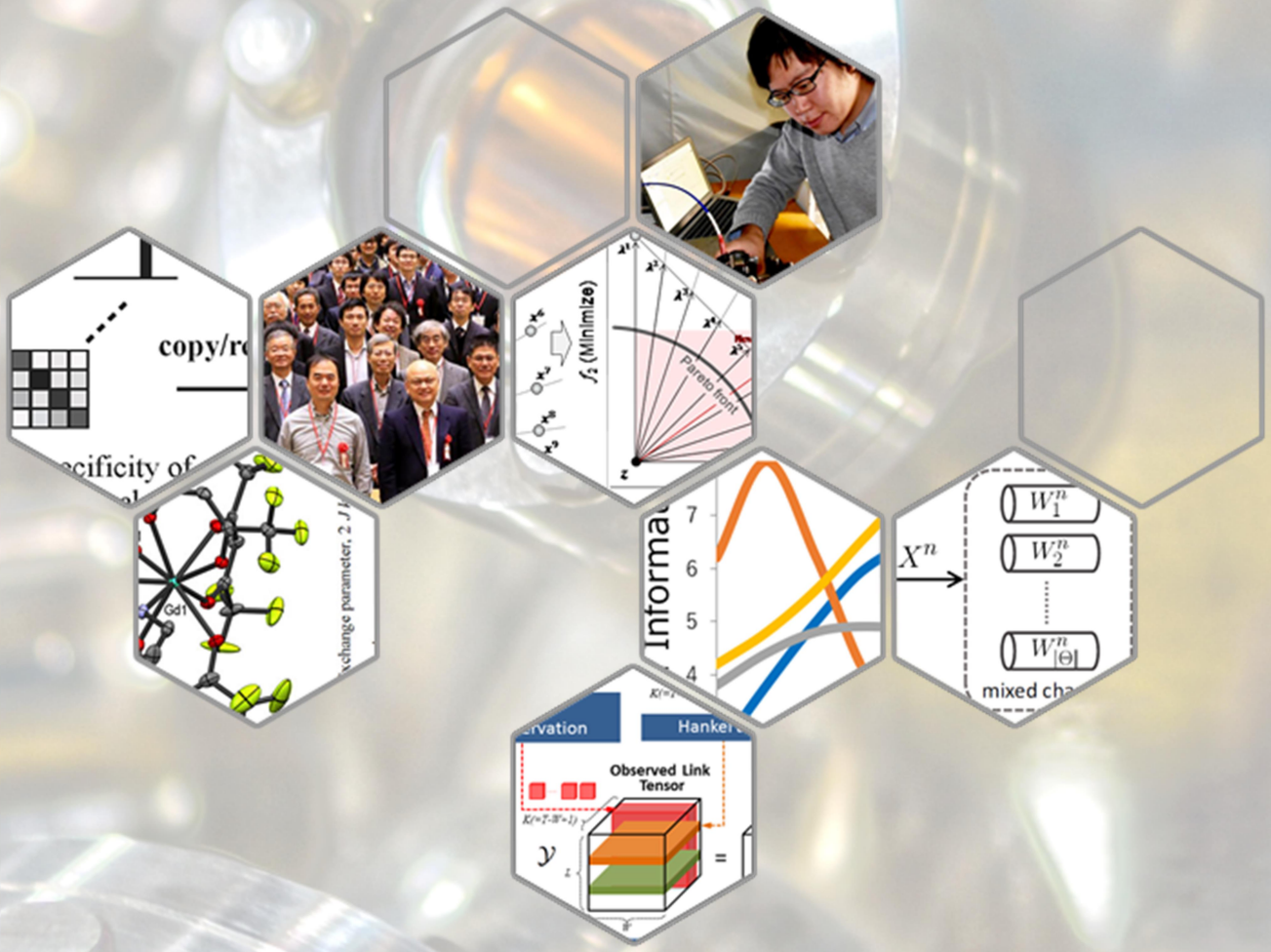
The University of Electro-Communications

UEC e-Bulletin

Updates on research, innovation, and events at UEC:
Unique and Exciting Campus in Tokyo

Vol.12, December 2016



The University of Electro-Communications 1-5-1 Chofugaoka, Chofu, Tokyo 182-8585

The University of Electro-Communications
UEC e-Bulletin
Vol.12, December 2016

Feature

Research Highlights

Topics

News and Events

The University of Electro-Communications
UEC e-Bulletin Vol.12, December 2016

Navigating the open seas of graduate school

The move from undergraduate studies based on highly structured lecture courses with clearly defined goals and timelines to the nerve racking freedom offered by graduate school is a challenging transition. Here, three UEC graduate students describe their goals and share their aspirations in pursuit of scientific excellence.

Time management and freedom

"As an undergraduate I had to take many lecture courses, write reports, attend seminars for credits to complete my course, says Kanami Ikeda. "It was an extremely busy time. I recall having little time to think. But now as a graduate school student there are hardly any compulsory courses, and I have much more time to think about my research. This newly discovered freedom comes with the challenge of the necessity for careful time management to conduct experiments, write papers, and so on."

This view is echoed by Ryoji Yukino, a first year doctoral student. "As a graduate student I think that I am living my own life," says Ryoji. "I am able to make my own decisions about how to proceed with my research. It's much more enjoyable that undergraduate courses and lectures."

Akihiro Ondo shares these views: "I have realized that the research experiments are not like those described in textbooks. In research, the experiments do not always go according to plan. They can yield inexplicable results. It's a different world."

Communication skills

Attending international conferences is an integral part of being a graduate student. Such meetings demand good communication skills from both the speaker's podium and during networking events.

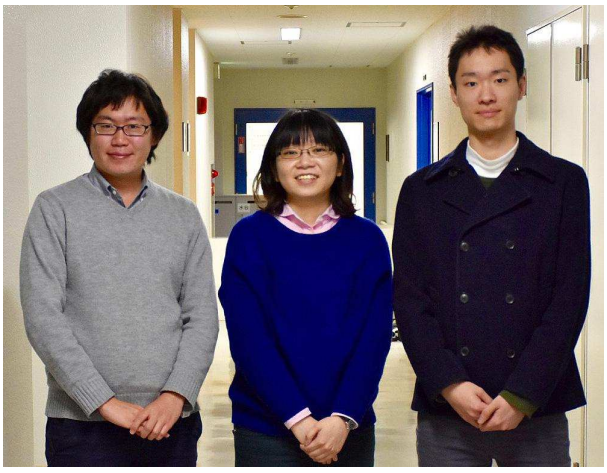
"I was really nervous during my first poster presentation at an international conference," says Ryoji. "One of my main concerns was whether anyone would visit my poster. Thankfully, many people stopped and asked questions. This gave me confidence in describing my research to people I had not ever met before."

Speaking to an audience with a projector and slides can also be demanding. "I remember that I could not reply to questions after finishing my first ever conference presentation," confides Kanami. "My mind suddenly went blank. Following this experience, I focused on improving my presentation skills. The Q&A sessions are fine now."

Plans for the future

UEC graduates are in great demand by Japanese industry reflecting the high-quality of research conducted at the University.And, like all UEC graduates, Kanami, Ryoji, and Akihiro will have many choices after completing their research. "I have not decided what I want to do yet," says Kanami. "Focusing on the

applications of my research would be one avenue to follow. Although I am also interested in teaching and academia."



Ryoji Yukino (left), Kanami Ikeda (center) and Akihiro Ondo.

Kanami Ikeda (2nd year doctoral student)
Graduate School of Informatics and Engineering, University of Electro-Communications.

Research

Optical correlation for ultra-high speed data analysis
Key words: Optical correlation, optical disk, holography.

Group and website

Eriko Watanabe Lab
http://mp-image.f-lab.tech.uec.ac.jp/
http://www.uec.ac.jp/eng/research/introduction/opal-ring/0005841.html
Summary of a presentation at Irago Conference 2016, (1-2 November 2016, UEC, Chofu, Tokyo).
http://www.iragoconference.jp/

Stabilization of the optical correlation output signal using new methods

The volume of information that is not only generated by people but also generated by, for example, sensors such as those in cameras, has been dramatically increasing. Faster technologies that can analyze the enormous amount of data are required. We have developed an optical correlation system using a coaxial holography system. This optical correlation system has a simple configuration and has a compatibility with a control technique of the conventional optical disk. We improved the disk rotation speed by weight reduction of the objective lens and reduced the shift pitch of the shift multiplex recording for 2μm. We achieved 2.4 Mfps

optical correlation experiment that is equivalent to 143 Gbps data transfer speed. We also developed a demonstration system using the optical correlator in a cloud environment.
In this study, for its practical use, we improve the stability of the optical correlation system introducing a new structure disk and a feedback servo system. A simple structure disk without a dichroic layer was designed and fabricated for tracking the servo system although two different color lasers was used. More than 1000 holograms with a 2 μm pitch were written using the high-power green pulse laser and tracking on a single circular groove track. The stable optical correlation signals were obtained from the written holograms using the green CW laser. Therefore, the optical correlation system enable us to demonstrate the image matching for a large number of the database images.

Kanami Ikeda, UEC, Tokyo.

Ryoji Yukino
Graduate School of Informatics and Engineering, University of Electro-Communications.

Research

Magnetic nanoparticle based point of care medical diagnostics
Keywords: Medical diagnostics, magnetic nanoparticles, biosensing, nano-diffraction gratings

Group and website

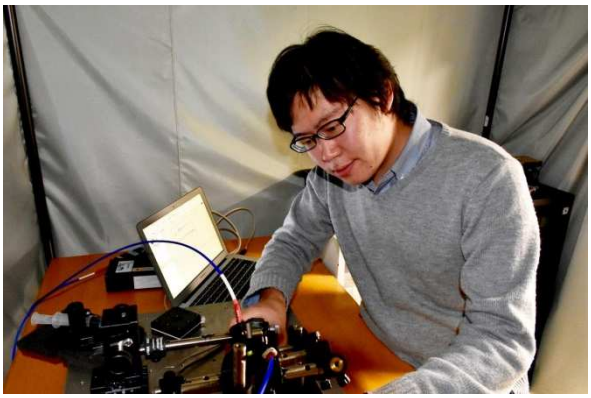
Adarsh Sandhu Lab
http://www.sandhu.jp/
Summary of a presentation at Irago Conference 2016, (1-2 November 2016, UEC, Chofu, Tokyo).
http://www.iragoconference.jp/

Smartphone-based Platform for Medical Diagnostics

There is increasing demand for point of care medical testing (POCT) in developing countries in the form of simple kits for home use. We are developing POCT protocols based on magnetic nanoparticles, CCD imaging,

and smartphones. Here, we describe biomolecule detection by combining a diffraction grating biosensor and smartphone spectroscope.

We used biosensors made of silicon nitride diffraction grating-biosensors fabricated by electron beam lithography. A diffraction grating sensor irradiated with white light only reflects a narrow band of light with a well-defined peak wavelength. The peak wavelength shifts with changes in the refractive index of the surface of the grating. Now, due to the fact that biomolecules have high refractive indices, when they are attached to the sensor, the peak wavelength shifts significantly. Our concept also includes using the CCD camera of a smartphone as a spectroscope to analyze the signal from the diffraction grating sensor. Notably, our system is compact, portable and it is easy to transmit data to centralized health institutes anywhere in the world. In proof of principle experiments, we demonstrated how a diffraction grating sensor can be used to measure the concentration of biomolecules with an avidin-biotin complex. Avidin-biotin interaction was selected because of its well-known bond strength approaching that of a covalent bond with a high affinity constant. Our system clearly detected changes in the concentration of avidin concentration using the smartphone spectrometer.



Ryoji Yukino, UEC, Tokyo.

Akihiro Ondo (1st year master's student)
Graduate School of Informatics and Engineering, University of Electro-Communications.

Research

Development of magnets using organic-organic spin-crossover (SCO) materials.
Key words: Molecule-based magnet, magnetic materials, coordination compounds, organic free radicals.

Group and website

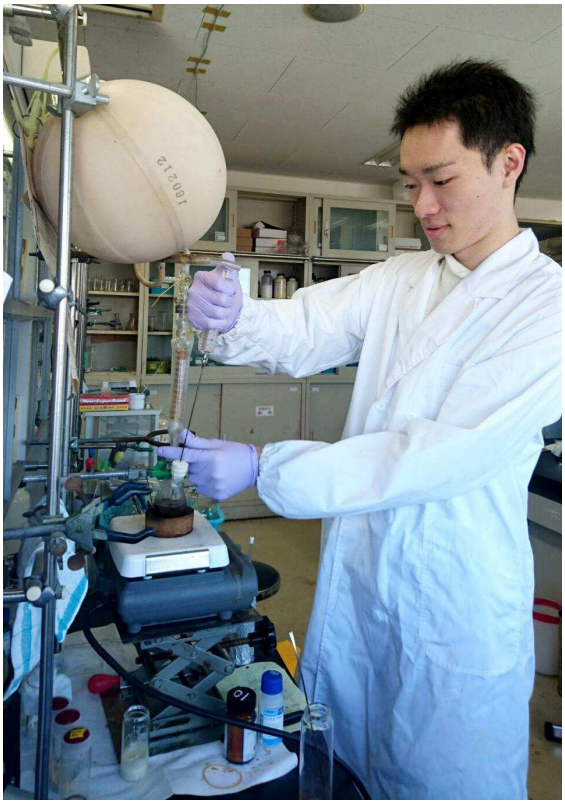
Takayuki Ishida Lab
http://www.uec.ac.jp/eng/research/introduction/opal-ring/0000392.html
Ishida Lab (Japanese)
http://ttf.pc.uec.ac.jp/

The University of Electro-Communications
UEC e-Bulletin Vol.12, December 2016

Summary of a presentation at Irago Conference 2016, (1-2 November 2016, UEC, Chofu, Tokyo).
http://www.iragoconference.jp/

Structures and Magnetic Properties of Transition-Metal Complexes Involving Bipyridinyl Nitroxide Radicals

Metal-radical hybrid solids have well been investigated toward magnetic materials which show various physical properties on the molecular level. Heteroaromatic substituents (Ar's) are utilized in Ar-NN and Ar-NO, and the Ar groups can ligate transition-metal ions. Exchange coupling is one of the most important parameters in magnetic materials. Magnetic exchange interactions between the radical group and metal ion across the Ar group are larger in Ar-NO than those in Ar-NN, because of larger spin-delocalization on the Ar group. The singly occupied molecular orbital of NN has a node at the central carbon of the NN group, whereas NO is attached to the aromatic ring directly at the spin-carrying N atom. Heteroaromatic-substituted tert-butyl nitroxide radicals were studied. Heteroaromatic rings are known to have a weaker stabilizing effect than phenyl, as indicated by the fact that tert-butyl pyridyl nitroxides are unisolable. Thus, we introduced an additional stabilizing group to a pyridine ring and synthesized and isolated radical ligands containing 2,2'-bipyridine, namely 4bpyNO, 5bpyNO, and 6bpyNO and investigated the structures and magnetic properties of transition-metal complexes involving the above radicals.



Akihiro Ondo, UEC, Tokyo.

UEC The University of Electro-Communications
UEC e-Bulletin Vol.12, December 2016

Network traffic anomaly detection - machine learning

"Diagnosing unusual events (called "anomalies") in a large-scale network like Internet Service Providers and enterprise networks is critical and challenging for both network operators and end users," explain Hiroyuki Kasai from The University of Electro-Communications in Japan, and co-authors Wolfgang Kellerer Martin Kleinsteuber at the Technical University of Munich in Germany in a recent report. In their latest work they devise a computationally efficient and effective algorithm to identify network level anomalies by exploiting the state-of-the-art machine learning algorithms, especially the large-scale higher-order tensor tracking technique.

Kasai, Kellerer and Kleinsteuber describe their system as data flows from origin to destination along courses that cross at various links. Measuring the traffic volume of each flow is incredibly data intensive, so instead the researchers focus on the directly observable but coarse link matrix, for which they then need to identify how they can estimate the unobservable flow matrix for the full network from the link matrix.

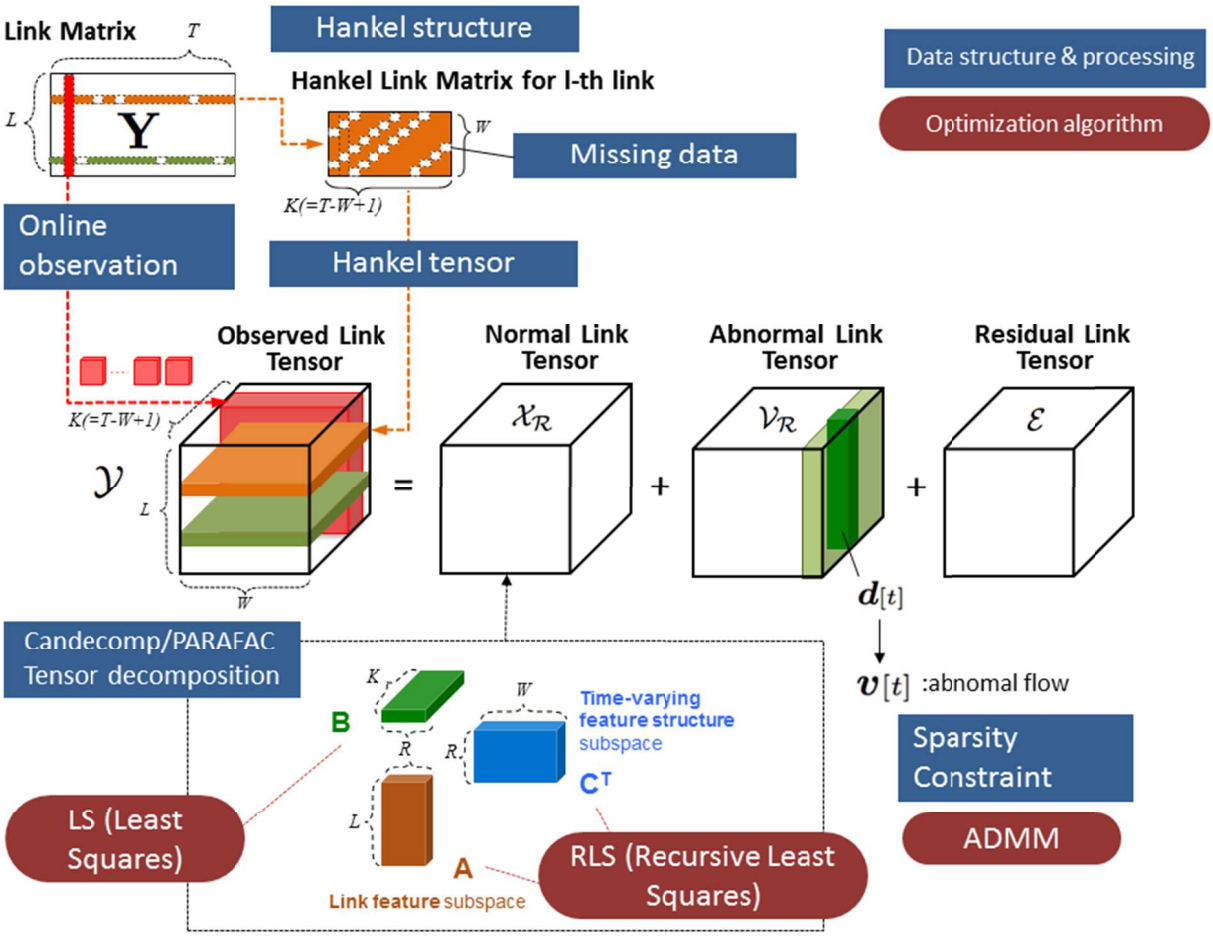
The researchers also avoid storage issues for large sets of archive data by developing the algorithm to operate online. They formulate their system with a latent structure of normal flows with noise, and they can then estimate abnormal flows as outlier sparse flows by leveraging sparse modelling.

As the researchers point out in their report, network anomalies can be caused by deliberate malicious operations, or misconfigurations and failures of network equipment, all of which are important to identify. They add, "Extensive numerical evaluations show that the proposed algorithm achieves faster convergence per iteration of model approximation, and better volume anomaly detection performance compared to state-of-the-art algorithms."

Reference

Hiroyuki Kasai[1,2], Wolfgang Kellerer[3], and Martin Kleinsteuber[3], Network volume anomaly detection and identification in large-scale networks based on online time-structured traffic tensor tracking, *IEEE Transactions on network and service management* **13**, 636-650 (2016) DOI: 10.1109/TNSM.2016.2598788.

1. University of Electro-Communications, Tokyo 182-8585, Japan
2. Previously in the Department of Electrical and Computer Engineering, Technical University of Munich, 80333 Munich, Germany
3. Department of Electrical and Computer Engineering, Technical University of Munich, 80290 Munich, Germany



Basic architecture and procedures of the proposed algorithm

Associate Professor: Hiroyuki KASAI (Doctor of Engineering from Waseda University 2000/03)
Current research areas: Optimization Theory, Machine Learning, Signal Processing
Current research subjects: Non Linear and Non-convex Optimization, Optimization on Riemannian Manifolds, Stochastic Optimization, Convergence Theory and Analysis, Machine Learning for Large Scale Data, Matrix/tensor Factorization/decomposition, Low-rank Approximation, Distributed Optimization, Sparse Signal Representation and Processing
Personal website: http://kasai.kasailab.com/index.php/contact/

The University of Electro-Communications
UEC e-Bulletin Vol.12, December 2016

Coding theorem defines decoding error capacity for general scenarios

The rate at which information can be coded so that it can be decoded within a particular error probability constraint is one of the "major research topics in information theory" as Hideki Yagi at the University of Electro-Communications, Te Sun Han at the National Institute of Information and Communications Technology, and Ryo Nomura at Senshu University in Japan explain in their recent report. In this latest work they formulate a theorem for a general class of coding theorems that gives a formula for the decoding error capacity. They also show how the theorem reduces to known theorems for more restricted scenarios.

The researchers describe their system as an input stream that is coded into the output by a channel sequence. The channel capacity is then the rate at which information can be reliably transmitted by that channel.

Previous work has demonstrated formulae for the error capacity for coding channels but they were limited by the length of the coding stream - which becomes uncomputable for general scenarios. Other work has characterised the channel capacity in such a way that the complexity does not increase with the channel length, but they are limited in terms of what mixture of channel types can be coded in this way.

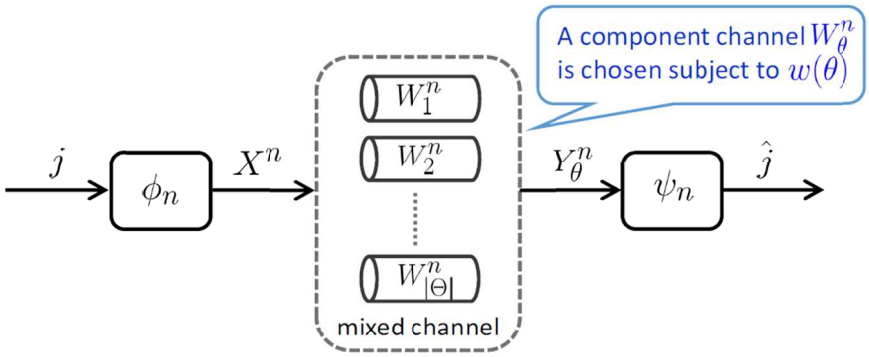
While progress has been made towards more general theorems, Yagi, Han and Nomura now establish the first-order coding theorem, which gives a formula for the error-capacity for mixed memoryless channels with general mixture. They also provide a direct part of the second-order coding theorem, and show that other previously established formulas can be obtained by reducing the theorem to restricted scenarios.

They add in their concluding remarks, "Extensions of the established formulas for mixed channels with general input and/or output alphabets are interesting and practically important research subjects."

Reference

Hideki Yagi[1], Te Sun Han[2], and Ryo Nomura[3] First- and second-order coding theorems for mixed memoryless channels with general mixture, IEEE Transactions on Information Theory (Volume: 62, Issue: 8, Aug. 2016), DOI: 10.1109/TIT.2016.2573310

1. Dept. of Communication Engineering and Informatics, The University of Electro-Communications, Tokyo, Japan
2. T. S. Han is with the National Institute of Information and Communications Technology (NICT), Tokyo, Japan
3. R. Nomura is with School of Network and Information, Senshu University, Kanagawa, Japan



- W_θ^n: component channel parameterized by θ
- W^n: mixed channel, given by

$$W^n(\boldsymbol{y}|\boldsymbol{x}) = \underbrace{\int_\Theta W_\theta^n(\boldsymbol{y}|\boldsymbol{x})dw(\theta)}_{\text{a mixture of } \{W_\theta^n\}}$$

The coding system over mixed channels with general mixture.

Associate Professor: Hideki YAGI (Doctor of Engineering from Waseda University 2005/12)
Current research areas: Communication/ Network engineering, Theory of informatics
Current research subjects: Coding theory, Information theory, Error correcting code, Information security
Personal website: http://www.ict.cei.uec.ac.jp/yagilab/

The University of Electro-Communications
UEC e-Bulletin Vol.12, December 2016

Engineering: Improvements to a decision-making algorithm

In fields such as engineering, economics or finance, highly complex decisions must be made, often incorporating multiple, at times contradictory, objectives. Highly specialised computer algorithms can help find the best possible solutions to these multi-objective problems (MOPs).

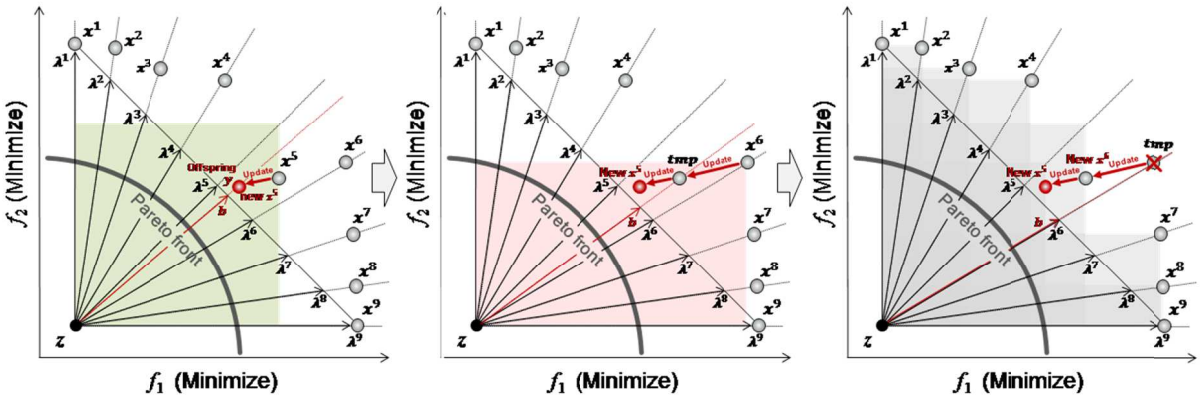
One such algorithm is MOEA/D (multi-objective evolutionary algorithm based on decomposition), which works by decomposing MOPs into single 'sub-problems', before selecting and presenting an optimal set of possible solutions known as the 'Pareto frontier'. The Pareto frontier is useful to designers and engineers, for example, because it helps them make trade-offs that allow for the best solution to a MOP.

Now, Hiroyuki Sato at the University of Electro-Communications in Tokyo has made improvements to the way in which MOEA/D searches for this optimal set of solutions. The method, which is based upon a chain-reaction solution update, deliberately ignores duplicated solutions within a search, thus enhancing the diversity of the solution population during a search. It also determines the order of existing search solutions to be presented in any one objective space; it does not automatically delete a solution if another neighbouring solution is deemed better but rather allows the user to specify target areas of the Pareto frontier that need to be met.

Further, the chain-reaction solution update allows for existing solutions to be replaced, and it will automatically back-track to check for alternative search directions. Initial trials using the updated MOEA/D with 2-8 objectives showed improvements in its searching ability by enhancing solution diversity, although further investigations are needed into the computational costs of the proposed update.

Reference

1. Sato, H. Chain-reaction solution update in MOEA/D and its effects on multi- and many-objective optimization. *Soft Comput* **20** (2016) 20: 3803. doi:10.1007/s00500-016-2092-3



The chain-reaction update to effectively replace existing solutions for the search of the Pareto frontier.
Hiroyuki Sato at the University of Electro-Communications in Tokyo, Japan, has made improvements to ability of the MOEA/D algorithm to search for the best solutions in multi- and many-objective decision-making problems.

The University of Electro-Communications
UEC e-Bulletin Vol.12, December 2016

Associate Professor: Hiroyuki SATO (Ph. D from Shinshu University 2009/3)
Current research areas: Soft computing
Current research subjects: Single- and multi-objective optimization, Evolutionary computation, multi-criteria decision making, and their applications.
Personal website: http://hs.hc.uec.ac.jp/

The University of Electro-Communications
UEC e-Bulletin Vol.12, December 2016

Speech signal processing: Enhancing voice conversion models

Altering a person's voice so that it sounds like another person is a useful technique for use in security and privacy, for example. This computational technique, known as voice conversion (VC), usually requires parallel data from two speakers to achieve a natural-sounding conversion. Parallel data requires recordings of two people saying the same sentences, with the necessary vocabulary, which are then time-matched and used to create a new target voice for the original speaker.

However, there are issues surrounding parallel data in speech processing, not least a need for exact matching vocabulary between two speakers, which leads to a lack of corpus for other vocabulary not included in the pre-defined model training. Now, Toru Nakashika at the University of Electro-Communications in Tokyo and co-workers have successfully created a model capable of using non-parallel data to create a target voice - in other words, the target voice can say sentences and vocabulary not used in model training.

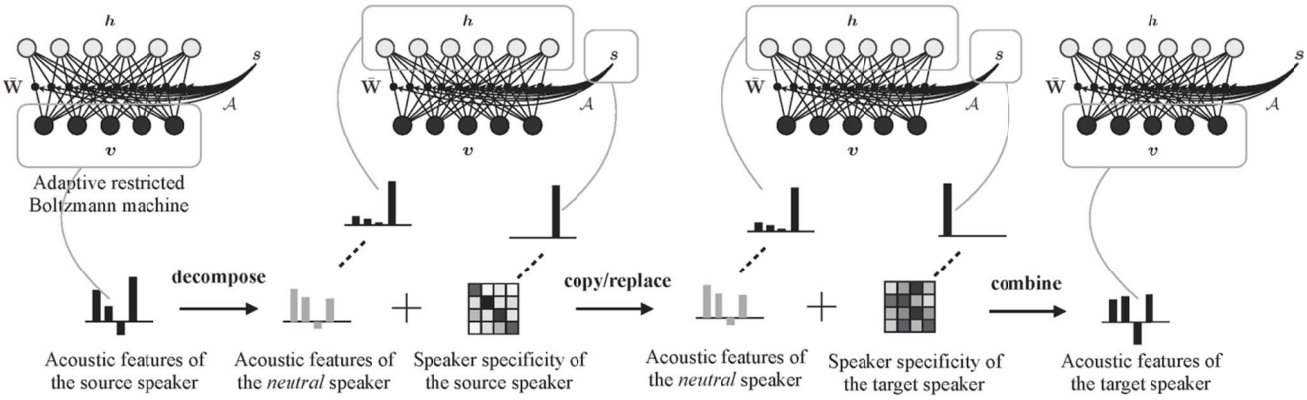
Their new VC method is based on the simple premise that the acoustic features of speech are made up of two layers - neutral phonological information belonging to no specific person, and 'speaker identity' features that make words sound like they are coming from a particular speaker. Nakashika's model, called an adaptive restricted Boltzmann machine, helps deconstruct speech, retaining the neutral phonological information but replacing speaker specific information with that of the target speaker.

After training, the model was comparable with existing parallel-trained models with the added advantage that new phonemic sounds can be generated for the target speaker, which enables speech generation of the target speaker with a different language.

Reference

1. Nakashika, T., Takiguchi, T. & Minami, Y. Non-parallel training in voice conversion using an adaptive restricted Boltzmann machine. *IEEE/ACM transactions on audio, speech and language processing* **24** (11) (2016) DOI: 10.1109/TASLP.2016.2593263

The University of Electro-Communications
UEC e-Bulletin
Vol.12, December 2016



Researchers in Japan have created a new voice conversion method using an adaptive restricted Boltzmann machine - a model capable of deconstructing speech and rebuilding it to sound like a different person speaking. Crucially, this model works without the need for parallel data from two speakers for training, meaning target voices can say words and sentences not used in training.

Associate Professor: Toru NAKASHIKA (Ph.D. in Engineering from Kobe University 2014/09/25)
Current research areas: Multimedia database, Cognitive science, Perceptual information processing
Current research subjects: Simultaneous Emotion/Phoneme/Identity Separation and Intention Estimation, Discovery of Mechanism for Human Activity and Recognition Based on Statistical Modelling
Personal website: http://www.sd.is.uec.ac.jp/nakashika/index.html

Professor: Yasuhiro MINAMI (Ph. D from Keio University 1991/03)
Current research areas: Cognitive science, Human interface and interaction, Intelligent informatics, Intelligent robotics, Learning support system
Current research subjects: Human interface and interaction
Personal website: http://www.sd.is.uec.ac.jp/index.html

The University of Electro-Communications
UEC e-Bulletin Vol.12, December 2016

Evaluating the evaluators: Analysis of big data for peer assessment

Assistant Professor Masaki Uto and Professor Maomi Ueno are pursuing research in areas including machine learning, artificial intelligence, information science, statistics, and educational technology, at the Department of Computer and Network Engineering, Graduate School of Informatics and Engineering, University of Electro-Communications.

"My research is based on Bayesian statistics," says Uto. "I construct and optimize statistical models such as the latent variable model and use machine learning and artificial intelligence to analyze big data for applications including e-Testing, e-Learning."

Recent research includes the development of 'massive rating technology' with the inclusion of modelling parameters accounting for unique characteristics of reviewers for assessing the accuracy and reproducibility of data collected for rating of on line shopping; replies to questionnaires; quality control of cloud sourcing; peer review of reports for massive open online courses; and evaluation of university entrance exams based on written essays.

"The important point in this research is estimating the 'true score' of such ratings," explains Uto. "We incorporate reviewer characteristic parameters in our item response model (latent variable model)."

Uto and colleagues have been successful in assessing a wide range of reviewers using this approach [1]. Importantly, the UEC researchers are collaborating with partners on developing practical applications of their 'rating technology'. Recent examples of real-life applications are:

- e-Testing (Computer based testing) [2] with the Benesse Holdings, Inc. and the Information-technology Promotion Agency (IPA).
- English language exams with the Eiken Foundation of Japan.
- Medical examinations with Common Achievement Tests Organization (CATO)
- Selecting reviewers for specific assessments with Recruit Career Co., Ltd.

Further information

Publication

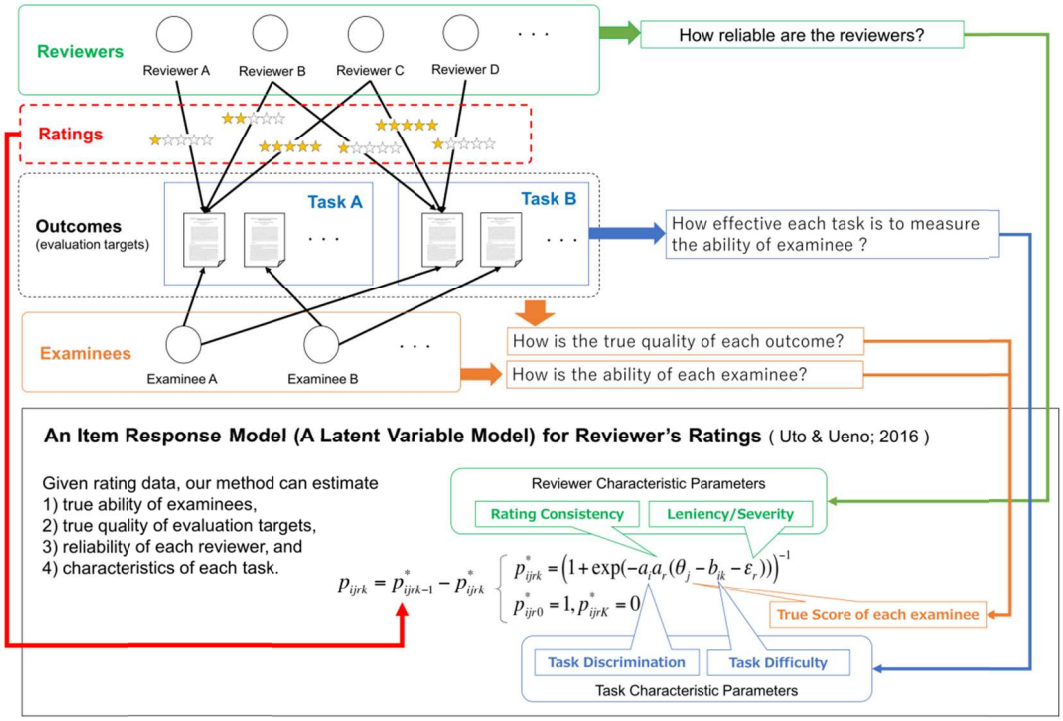
Masaki Uto and Maomi Ueno, Item Response Theory for Peer Assessment, *IEEE TRANSACTIONS ON LEARNING TECHNOLOGIES*, 9, 157, (2016)

Maomi Ueno Lab, UEC

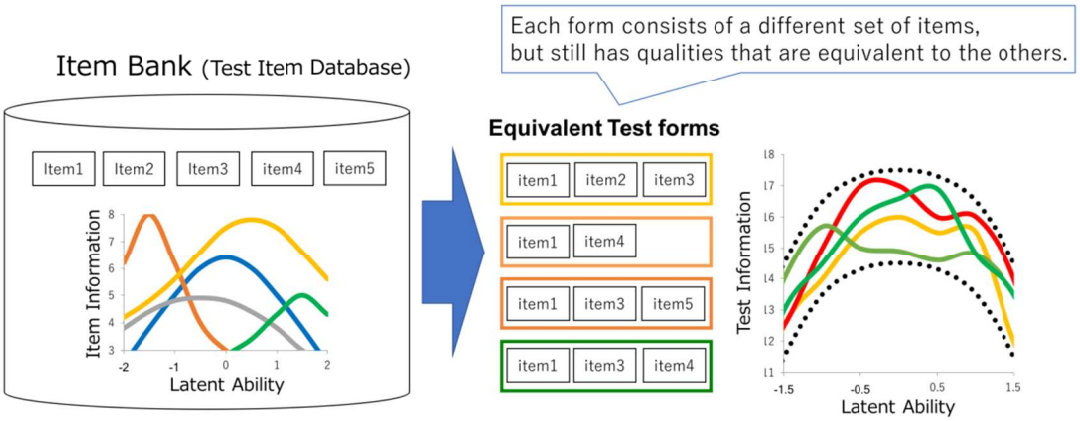
http://www.ai.lab.uec.ac.jp/index-e/

Masaki Uto

https://sites.google.com/site/utomasakieng/



Automated test assembly as a combinatorial optimization problem



Assistant Professor: Masaki Uto (Ph. D. from University of Electro-Communications 2013/09)
Current research areas: Bayesian Statistics, Machine Learning, Big Data, Data Science, Bayesian Natural Language Processing, Artificial Intelligence, e-Testing, e-Learning, Information Systems
Current research subjects: Rating big data analysis, Bayesian network, argument mining, e-Testing,
Personal website: https://sites.google.com/site/utomasakieng/

The University of Electro-Communications
UEC e-Bulletin Vol.12, December 2016

Attraction of complex chemistry: Quest for innovative single-molecule magnets

Professor Takayuki Ishida
Department of Engineering Science, Graduate School of Informatics and Engineering

"I am a molecular/crystal designer", says Professor Takayuki Ishida, at the Department of Engineering Science, Graduate School of Informatics and Engineering, University of Electro-Communications. "My research started by trying to answer the question: 'can organic materials be magnetic?" My policy for research in order to answer this question has been: chemical and physical properties must be predictable from structures, and molecular and crystal structures must be designed for target properties."

Professor Ishida is focused on three main areas of research: spin science in materials chemistry; resolving unknown aspects of lanthanoid periodicity; and innovative technological applications of lanthanoid elements. Ishida is one of the pioneers in synthesizing ferromagnetic organic compounds--materials that were thought to be diamagnetic before this discovery.

"My group holds the record for the strongest ferro- and antiferromagnetic couplings in lanthanoid(III)-nitroxide compounds," explains Ishida. "This follows the success of our approach focused on the metal−radical approach with large out-of-plane torsion between lanthanoid and radical groups for synthesis of molecular magnets" [1]. This discovery is extendable to other metal ions and particularly important to meet demand for alternatives to Nd-Fe-B magnetics incorporating rare earth elements, that are expensive and in short supply.

Such lanthanoid complexes are expected to have many industrial applications including media for storing data, as well as novel luminescent single-molecule exploiting the light emitting properties of lanthanoid complexes.

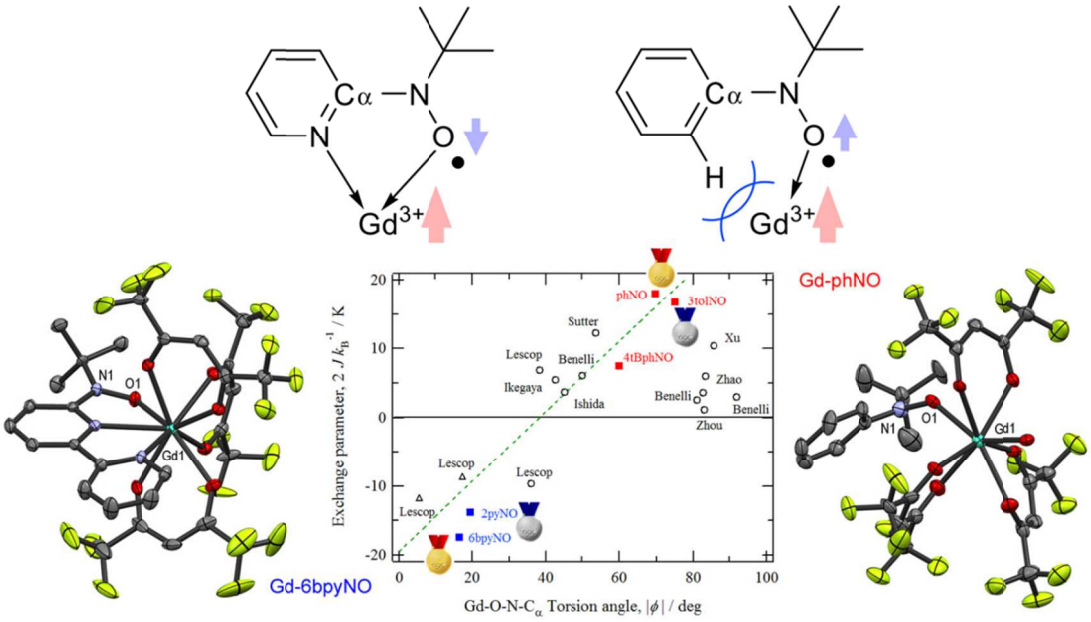
Ishida hopes that his research will add a "new page to chemistry books" as research has led to in depth knowledge about lanthanoid ions, in particular the exchange coupling interaction with organic radicals.

Further information

Takayuki ISHIDA Laboratory
http://www.uec.ac.jp/eng/research/introduction/opal-ring/0000392.html
Ishida Lab (Japanese)
http://ttf.pc.uec.ac.jp/

[1] Takuya Kanetomo, Toru Yoshitake, and Takayuki Ishida, Strongest Ferromagnetic Coupling in Designed Gadolinium(III)−Nitroxide Coordination Compounds, Inorganic Chemistry, 55, 8140−8146 (2016).
DOI: 10.1021/acs.inorgchem.6b01072

The University of Electro-Communications
UEC e-Bulletin
Vol.12, December 2016



Professor: Takayuki ISHIDA (D. Sc. from The University of Tokyo 1991/03)
Current research areas: Materials chemistry, magnetochemistry, physical organic chemistry
Current research subjects: Single-molecule magnets, heterospin materials, hysteretic spin-crossover compounds, room-temperature triplet biradicals, functional materials based on supramolecular science
Personal website: http://ttf.pc.uec.ac.jp/www.page/Ishida.html

The University of Electro-Communications
UEC e-Bulletin Vol.12, December 2016

Irago Conference 2016 is held at UEC, Tokyo.

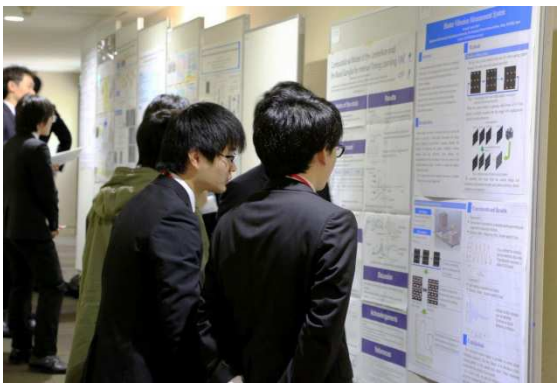
The Irago Conference 2016 was held 1-2 November 2016 at the University of Electro-Communications, Chofu City, Tokyo.

Since its inception in 2011, the "Interdisciplinary Research And Global Outlook" conference has been recognized as a unique platform for a "360 degree outlook on critical scientific and technological challenges for a sustainable society". In particular, the conference offers an excellent opportunity for graduate students to interact firsthand with internationally acclaimed experts from wide ranging of disciplines, as well as publish referred, open access papers in the AIP Conference Proceedings series.

Organized jointly by UEC, Tokyo and Toyohashi University of Technology, the theme of this year's conference was "Waves in Science", and approximately 200 participants actively listened to invited talks that ranged from gravitational waves and the future of music therapy, to 5G mobile communications and photon-nano science.

Specifically, there 19 invited talks, including speakers from South Africa, Hong Kong, and USA; 3 contributed oral presentations; 14 talks at the Graduate Student Session; and 90 posters.

Participants gathered for a group photo at the break of the IRAGO 2016 conference.



Attendees discussing the research presented at the Poster Session.

Highlights of the conference include the Best Presentation Award for the Graduate Student Sessions held during the lunch breaks, and the Best Poster Award. Notably, the entire proceedings were transmitted live via the internet, reflecting the global nature of the conference.

In addition to the wide ranging technical discussions, Irago is also famous for the exciting and thought provoking conference banquet and social events. This year's events included the energetic sounds of Japanese drums (wadaiko), classical music based on a fusion of 'koto', vocal, violin, and piano, as well as popular sounds performed by members of UEC staff.

Japanese drums (WADAIKO) performed by Team HIMIKO.

The Irago Conference 2017 is scheduled to be held at UEC, Tokyo in October/November 2017.

Further information

The Irago Conference 2016
http://www.iragoconference.jp/2016/publication.html

The University of Electro-Communications
UEC e-Bulletin
Vol.12, December 2016

UEC students receive Irago Conference 2016 Awards

UEC graduate students Kanami Ikeda and Natsumi Hara received the Irago Conference 2016 Best Graduate Student Presentation and Best Poster awards, respectively.

The recipients were selected by votes cast by the more than 200 participants of the Irago Conference 2016 held at the Auditorium, University of Electro-communications, 1-2, November 2016.

Yoshiaki Tamura (1st year master's student, Graduate School of Electrical and Electronic Information Engineering, Toyohashi University of Technology) received the Best Presentation Award for the Graduate Student Session on the first day for his presentation: "A Fundamental Study on Carbon Composites of $FeF_3 \cdot 0.33H_2O$ as Open-framework Cathode Materials for Calcium-ion Batteries".

The recipient of the Best Presentation award of the Graduate Student Session on the second day was Kanami Ikeda (2nd year doctoral student, Graduate School of Informatics and Engineering, University of Electro-Communications) for her presentation: "Stabilization of the optical correlation output signal using new methods".

The Best Poster Award for the conference was given to Natsumi Hara (2nd year mater's student, Graduate School of Informatics and Engineering, University of Electro-Communications) for her poster: "Evaluation of planar light wave circuit for digital holographic microscope".

UEC, Tokyo, President Takashi Fukuda presented the award certificates to Miss Ikeda and Miss Hara on 24 November 2016.

Further information

Irago Conference 2016
http://www.iragoconference.jp/

UEC, Tokyo, President Takashi Fukuda (center) after presenting Miss Kanami Ikeda (left) and Miss Natsumi Hara (right) their awards on 24 November 2016.

The University of Electro-Communications (UEC) in Tokyo

is a small, luminous university at the forefront of pure and applied sciences, engineering, and technology research. Its roots go back to the Technical Institute for Wireless Commutations, which was established in 1918 by the Wireless Association to train so-called wireless engineers in maritime communications in response to the Titanic disaster in 1912. In 1949, the UEC was established as a national university by the Japanese Ministry of Education, and moved in 1957 from Meguro to its current Chofu campus Tokyo.

With approximately 4,000 students and 350 faculty, UEC is regarded as a small university, but with particular expertise in wireless communications, laser science, robotics, informatics, and material science, to name just a few areas of research.

The UEC was selected for the Ministry of Education, Culture, Sports, Science and Technology (MEXT) Program for Promoting the Enhancement of Research Universities as a result of its strengths in three main areas: optics and photonics research, where we are number one for the number of joint publications with foreign researchers; wireless communications, which reflects our roots; and materials-based research, particularly on fuel cells.

International Public Relations
The University of Electro-Communications
1-5-1 Chofugaoka, Chofu, Tokyo 182-8585
E-mail : kokusai-k@office.uec.ac.jp
Website : http://www.uec.ac.jp/eng/