

The 34<sup>th</sup>

# ROCLING 2022

第三十四屆自然語言與語音處理研討會

November 21-22, 2022, Taipei, Taiwan, R.O.C.

Proceedings of the Thirty-fourth Conference on  
Computational Linguistics and Speech Processing

**ROCLING 2022: The 34<sup>th</sup> Conference on  
Computational Linguistics and Speech Processing**

**第三十四屆自然語言與語音處理研討會**

November 21-22, 2022

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## Messages from Conference Chairs

On behalf of the Conference Chairs, I would like to welcome you to the 34th Conference on Computational Linguistics and Speech Processing (ROCLING 2022), which will be held in Taipei, Taiwan, from November 21<sup>st</sup> to 22<sup>nd</sup>, 2022. ROCLING 2022 is jointly hosted by Taipei Medical University (TMU), National Pingtung University (NPTU), and the Association for Computational Linguistics and Chinese Language Processing (ACLCLP). The Conference is also supported by the National Science and Technology Council and the Ministry of Education.

ROCLING 2022 is of special significance during this particularly exciting period: our field has grown drastically with NLP gaining much interest and prominence in both research and industry, and the barrier to entry lowered considerably. With the easing of COVID-19 related measurements worldwide this year, we are finally able to come together and attend the conference in person to interact and enjoy the exchange of expertise.

This Conference would not have materialized without the dedication, guidance and assistance from the Organizing Committee. Many thanks to the Program Chairs, Prof. Jheng-Long Wu and Prof. Ming-Hsiang Su, the Demo Chair, Prof. Hen-Hsen Huang, the Special Session Chairs, Prof. Chin-Hung Chou and Yuan-Fu Liao, and the Shared Task Chair, Prof. Lung-Hao Lee for their coordination of the review process, which enables top quality research papers and informative talks to be presented during the conference. We also like to thank Prof. Yi-Fen Liu for her assistance in the publication of conference proceedings, which will be published by ACL Anthology.

We are also extremely grateful to all sponsors for their continuous and generous support. In addition, we would like to thank the chairs of previous conferences for their gracious help and advice, passing on all the know-how with much patience. We would also like to express our gratitude to the reviewers, workshop organizers, tutorial instructors, authors and presenters of the papers, and invited speakers. We thank all authors who have submitted their work for review. Your hard work makes this conference exciting and our community strong.

Finally, we would like to thank you, our participant, for making all efforts to attend the Conference from November 21<sup>st</sup> to 22<sup>nd</sup>, 2022. Please enjoy yourself, and We hope you will leave feeling scientifically engaged and happy with all the new connections you have made with like-minded peers.

Welcome and enjoy the conference!

Yung-Chun Chang, Taipei Medical University  
Yi-Chin Huang, National Pingtung University  
**ROCLING 2022 Conference Chairs**

## **Messages from Program Chairs**

The excellent program and activities of ROCLING 2022 are the result of collaborative efforts of more than 40 program committee members and conference organizers. Each paper has been reviewed by 2 to 3 PC members, and we thank all of them for their insightful reviews, from which we can build an outstanding technical program. We would also like to thank the Demo Chair, Dr. Hen-Hsen Huang of Academia Sinica, for coordinating three excellent tutorials. We are very grateful to the Publication Chair, Prof. Yi-Fen Liu of the Feng Chia University, for editing the conference proceedings. We would also like to express our gratitude to the Special Session Chairs, Prof. Chin-Hung Chou of National Central University and Prof. Yuan-Fu Liao of National Yang Ming Chiao Tung University, and Shared Task Chair, Prof. Lung-Hao Lee of National Central University, for organizing the special session and shared task that enable the outreach of conference events to many important communities. Last but not least, we appreciate the contributions of Conference Co-chairs, Prof. Yung-Chun Chang of Taipei Medical University, and Prof. Yi-Chin Huang of National Pingtung University, to the construction of the conference website and event coordination.

Jheng-Long Wu, Soochow University  
Ming-Hsiang Su, Soochow University  
**ROCLING 2022 Program Chairs**



## **NLP Keynote by Prof. Makoto P. Kato**



### **Matching Texts with Data for Evidence-based Information Retrieval**

**Speaker: Prof. Makoto P. Kato**

Professor, The University of Tsukuba, Japan

*Time: Monday, November 21, 2022, 09:00 - 10:00*

#### **Biography**

Makoto P. Kato received his Ph.D. degree in Graduate School of Informatics from Kyoto University, Sakyo Ward, Yoshidahonmachi, in 2012. Currently, he is an associate professor of Faculty of Library, Information and Media Science, University of Tsukuba, Japan. In 2008, he was awarded 'WISE 2008 Kambayashi Best Paper Award' through the article 'Can Social Tagging Improve Web Image Search?' with other researchers. In 2010, he served as a JSPS Research Fellow in Japan Society for the Promotion of Science. During the period 2010 to 2012, he also served in Microsoft Research Asia Internship (under supervision by Dr. Tetsuya Sakai in WIT group), Microsoft Research Asia Internship (under supervision by Dr. Tetsuya Sakai in WSM group), and Microsoft Research Internship (under supervision by Dr. Susan Dumais in CLUES group). From 2012, he worked as an assistant professor in Graduate School of Informatics, Kyoto University, Japan. His research and teaching career began, and he worked as an associate professor from 2019 in Graduate School of Informatics, Kyoto University, Japan. His research interests include Information Retrieval, Web Mining, and Machine Learning, while he is an associate professor in Knowledge Acquisition System Laboratory (Kato Laboratory), University of Tsukuba, Japan.

## **Abstract**

We are now facing the problem of misinformation and disinformation on the Web, and search engines are struggling to retrieve reliable information from a vast amount of Web data. One of the possible solutions to this problem is to find reliable evidences supporting a claim on the Web. But what are “reliable evidences”? They can include authorities' opinions, scientific papers, or wisdom of crowds. However, they are also sometimes subjective as they are outcomes produced by people.

This talk discusses some approaches incorporating another type of evidences that are very objective --- numerical data --- for reliable information access.

(1) Entity Retrieval based on Numerical Attributes. Entity retrieval is a task of retrieving entities for a given text query and usually based on text matching between the query and entity description. Our recent work attempted to match the query and numerical attributes of entities and produce explainable rankings. For example, our approach ranks cameras based on their numerical attributes such as resolution, f-number, and weight, in response to queries such as “camera for astrophotography” and “camera for hiking”.

(2) Data Search. When people encounter suspicious claims on the Web, data can be reliable sources for the fact checking. NTCIR Data Search is an evaluation campaign that aims to foster data search research by developing an evaluation infrastructure and organizing shared tasks for data search. The first test collection for data search and some findings are introduced in this talk.

(3) Data Summarization. While the data search project attempts to develop a data search system for end users and help them make decisions based on data, it is still difficult for users to quickly interpret data. Therefore, data summarization techniques are also necessary to enable users to incorporate data in their information seeking process. Recent automatic visualization and text-based data summarization techniques are presented in this talk.

# Speech Keynote by Prof. Junichi Yamagishi



## Speech Synthesis Research 2.0

**Speaker: Prof. Junichi Yamagishi**

Professor, National Institute of Informatics, Japan

*Time: Tuesday, November 22, 2022, 09:00 - 10:00*

### Biography

Junichi Yamagishi received the Ph.D. degree from Tokyo Institute of Technology in 2006 for a thesis that pioneered speaker-adaptive speech synthesis. He is currently a Professor with the National Institute of Informatics, Tokyo, Japan, and also a Senior Research Fellow with the Centre for Speech Technology Research, University of Edinburgh, Edinburgh, U.K. Since 2006, he has authored and co-authored more than 250 refereed papers in international journals and conferences. He was an area coordinator at Interspeech 2012. He was one of organizers for special sessions on “Spoofing and Countermeasures for Automatic Speaker Verification” at Interspeech 2013, “ASVspoof evaluation” at Interspeech 2015, “Voice conversion challenge 2016” at Interspeech 2016, “2nd ASVspoof evaluation” at Interspeech 2017, and “Voice conversion challenge 2018” at Speaker Odyssey 2018. He is currently an organizing committee for ASVspoof 2019, an organizing committee for ISCA the 10th ISCA Speech Synthesis Workshop 2019, a technical program committee for IEEE ASRU 2019, and an award committee for ISCA Speaker Odyssey 2020. He was a member of IEEE Speech and Language Technical Committee. He was also an Associate Editor of the IEEE/ACM TRANSACTIONS ON AUDIO, SPEECH, AND LANGUAGE PROCESSING and a Lead Guest Editor for the IEEE JOURNAL OF SELECTED

TOPICS IN SIGNAL PROCESSING special issue on Spoofing and Countermeasures for Automatic Speaker Verification. He is currently a guest editor for Computer Speech and Language special issue on speaker and language characterization and recognition: voice modeling, conversion, synthesis and ethical aspects. He also serves as a chairperson of ISCA SynSIG currently. He was the recipient of the Tejima Prize as the best Ph.D. thesis of Tokyo Institute of Technology in 2007. He received the Itakura Prize from the Acoustic Society of Japan in 2010, the Kiyasu Special Industrial Achievement Award from the Information Processing Society of Japan in 2013, the Young Scientists' Prize from the Minister of Education, Science and Technology in 2014, the JSPS Prize from Japan Society for the Promotion of Science in 2016, and Docomo mobile science award from Mobile communication fund in 2018.

### **Abstract**

The Yamagishi Laboratory at the National Institute of Informatics researches text-to-speech (TTS) and voice conversion (VC) technologies. Having achieved TTS and VC methods that reproduce human-level naturalness and speaker similarity, we introduce three challenging projects we are currently working on as the next phase of our research.

(1) Rakugo speech synthesis [1] As an example of a challenging application of speech synthesis technology, especially an example of an entertainment application, we have concentrated on rakugo, a traditional Japanese performing art. We have been working on learning and reproducing the skills of a professional comic storyteller using speech synthesis. This project aims to achieve an "AI storyteller" that entertains listeners, entirely different from the conventional speech synthesis task, whose primary purpose is to convey information or answer questions. The main story of rakugo comprises conversations between characters, and various characters appear in the story. These characters are performed by a single rakugo storyteller, who changes their voice appropriately so the listeners can understand and entertain them. To reproduce such characteristics of rakugo voice by machine learning, performance data of rakugo and advanced modeling techniques are required. Therefore, we constructed a corpus of rakugo speech without any noise or audience sounds with the cooperation of an Edo-

style rakugo performer and modeled this data using deep learning. In addition, we benchmarked our system by comparing the generated Rakugo speech with performances by Rakugo storytellers of different ranks ("Zenza/前座," "Futatsume/二つ目," and "Shinuchi/真打") through subjective evaluation.

(2) Speech intelligibility enhancement [2] In remote communication, such as online conferencing, there are environmental background noises on both speaker and listener sides. Speech intelligibility enhancement is a technique to manipulate speech signals so as not to be masked by the noise on the listener's side while maintaining the volume. This is not a simple conversion task since "correct teacher data" does not exist. For this reason, deep learning has not been used in the past, and there has been no significant technological progress. However, various possible practical applications exist, such as intelligibility enhancement of station announcements. Therefore, we proposed a network structure called "iMetricGAN" and its learning method, in which complex and non-differentiable speech intelligibility and quality indexes are treated as output values of a discriminator in an adversarial generative network, the discriminator approximates the indexes and based on the approximated indexes, a generator is used to transform an input speech signal into an enhanced, easy-to-hear speech signal automatically. Subject experiments confirmed that this transformation significantly improves keyword recognition in noisy environments.

(3) Speaker Anonymization [3, 4] Now that it is becoming easier to build speech synthesis systems that digitally clone someone's voice using 'found' data on social media, there is a need to mask the speaker information in speech and other sensitive attributes that are appropriate to be protected. This is a new research topic; it has not yet been clearly defined how speaker anonymization can be achieved. We proposed a speaker anonymization method that combines speech synthesis and speaker recognition technologies. Our approach decomposes speech into three pieces of information: prosody, phoneme information, and a speaker embedding vector called X-vector, which is standardly used in speaker recognition and anonymizes the individuality of a speaker by averaging only the X-vector with K speakers. A neural vocoder is used to re-synthesize high-quality speech waveform. We also introduce a speech database and evaluation metrics to compare speaker anonymization methods.

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# Table of Contents

Language Model Based Chinese Handwriting Address Recognition	1
Chinese Movie Dialogue Question Answering Dataset	7
Unsupervised Text Summarization of Long Documents using Dependency-based Noun Phrases and Contextual Order Arrangement	15
Enhancing Chinese Multi-Label Text Classification Performance with Response-based Knowledge Distillation	25
Combining Word Vector Technique and Clustering Algorithm for Credit Card Merchant Detection	32
Taiwanese-Accented Mandarin and English Multi-Speaker Talking-Face Synthesis System	40
Is Character Trigram Overlapping Ratio Still the Best Similarity Measure for Aligning Sentences in a Paraphrased Corpus?	49
RoBERTa-based Traditional Chinese Medicine Named Entity Recognition Model	61
A Study on Using Different Audio Lengths in Transfer Learning for Improving Chainsaw Sound Recognition	67
Using Grammatical and Semantic Correction Model to Improve Chinese-to-Taiwanese Machine Translation Fluency	75
Investigation of feature processing modules and attention mechanisms in speaker verification system	84
A Preliminary Study of the Application of Discrete Wavelet Transform Features in Conv-TasNet Speech Enhancement Model	92

Exploiting the compressed spectral loss for the learning of the DEMUCS speech enhancement network	100
Using Machine Learning and Pattern-Based Methods for Identifying Elements in Chinese Judgment Documents of Civil Cases	107
Development of Mandarin-English code-switching speech synthesis system	116
Predicting Judgments and Grants for Civil Cases of Alimony for the Elderly	121
Lightweight Sound Event Detection Model with RepVGG Architecture	129
Analyzing discourse functions with acoustic features and phone embeddings: non-lexical items in Taiwan Mandarin	136
A Dimensional Valence-Arousal-Irony Dataset for Chinese Sentence and Context	147
Intelligent Future Recreation Harbor Application Service: Taking Kaohsiung Asia New Bay as an Example to Construct a Composite Recreational Knowledge Graph	155
HanTrans: An Empirical Study on Cross-Era Transferability of Chinese Pre-trained Language Model	164
A Preliminary Study on Automated Speaking Assessment of English as a Second Language (ESL) Students	174
Clustering Issues in Civil Judgments for Recommending Similar Cases	184
Multifaceted Assessments of Traditional Chinese Word Segmentation Tool on Large Corpora	193
Mandarin-English Code-Switching Speech Recognition System for Specific Domain	200



Legal Case Winning Party Prediction With Domain Specific Auxiliary Models	205
Early Speech Production in Infants and Toddlers Later Diagnosed with Cerebral Palsy: A Retrospective Study	214
Automatic Generation of Abstracts for Research Papers	221
Speech Timing in Typically Developing Mandarin-Speaking Children From Ages 3 To 4	230
Right-Dominant Tones in Zhangzhou: On and Through Phonetic Surface	236
Web-API-Based Chatbot Generation with Analysis and Expansion for Training Sentences	246
The Design and Development of a System for Chinese Character Difficulty and Features	256
Image Caption Generation for Low-Resource Assamese Language	263
Building an Enhanced Autoregressive Document Retriever Leveraging Supervised Contrastive Learning	273
A Quantitative Analysis of Comparison of Emoji Sentiment: Taiwan Mandarin Users and English Users	283
Applying Information Extraction to Storybook Question and Answer Generation	289
Improving Response Diversity through Commonsense-Aware Empathetic Response Generation	299
A Preliminary Study on Mandarin-Hakka neural machine translation using small-sized data	307

NCU1415 at ROCLING 2022 Shared Task: A light-weight transformer-based approach for Biomedical Name Entity Recognition	316
CrowNER at Rocling 2022 Shared Task: NER using MacBERT and Adversarial Training	321
SCU-MESCLab at ROCLING-2022 Shared Task: Named Entity Recognition Using BERT Classifier	329
YNU-HPCC at ROCLING 2022 Shared Task: A Transformer-based Model with Focal Loss and Regularization Dropout for Chinese Healthcare Named Entity Recognition	335
NERVE at ROCLING 2022 Shared Task: A Comparison of Three Named Entity Recognition Frameworks Based on Language Model and Lexicon Approach	343
SCU-NLP at ROCLING 2022 Shared Task: Experiment and Error Analysis of Biomedical Entity Detection Model	350
MIGBaseline at ROCLING 2022 Shared Task: Report on Named Entity Recognition Using Chinese Healthcare Datasets	356
Overview of the ROCLING 2022 Shared Task for Chinese Healthcare Named Entity Recognition	363