The 4th International Conference on Artificial Intelligence in Information and Communication

IEEE ICAIIC 2022

IEEE ComSoc
IEEE Communications Society

February 21 (Mon.) ~ 24 (Thur.), 2022, Shilla Stay Jeju, Jeju Island, Korea

http://icaiic.org

Final Program

Organized by

KICS
The Korean Institute of Communications and Information Sciences

Technical Co-Sponsored by

IEEE

IEEE ComSoc
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Patrons

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Electronics and Telecommunications Research Institute

KETI
Korea Electronics Technology Institute

IITP
Institute of Information & Communications Technology Planning & Evaluation

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- Society Safety System Forum
- Internet of Energy Research Center (Kookmin University)
- Center for ICT & Automotive Convergence (Kyungpook National University)
- AI Mobility Research Institute (Kookmin University)

ICAIIC 2022

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Message from Organizing Chairs

Welcome to ICAIIC 2022, the Fourth International Conference on Artificial Intelligence in Information and Communication, organized by the Korean Institute of Communications and Information Sciences (KICS) and technically cosponsored by IEEE Communications Society (ComSoC) and IEICE-CS. The ICAIIC conference is pursuing a premier international forum to provide a great opportunity for exchanging the state-of-the-art research advances in artificial intelligence in information and communication and future technologies and expanding the research community.

We would like to welcome you to Jeju Island! Jeju Island is a popular vacation spot for Koreans and foreigners. Jeju Volcanic Island and Lava Tubes were inscribed on the World Heritage list. The island offers visitors a wide range of activities: hiking on Halla-san or Olle-Gil, catching sunrises and sunsets over the ocean, riding horses, touring all the locales from a favorite television K-drama, or just lying around on the sandy beaches. We have prepared an exciting program for you in ICAIIC 2022. The safety and well-being of all conference participants is our priority. The emergence of the Omicron variant has forced us to change the venue from Guam, USA to Jeju Island, Korea. ICAIIC has therefore taken the difficult decision to limit the number of participants in the venue. The conference will be a combination of online and offline events.

We would like to express our sincere gratitude to all committee members and referees who made tremendous contributions to this event. On behalf of the ICAIIC steering committee and on behalf of all attendees, we thank the President of KICS AI Society, professor Dong Seog Han, for producing such an excellent program. Thanks to the tireless efforts of the Technical Program Committee Chairs, Professors Seokjoo Shin, Youn-Hee Han, Mikio Hasegawa, Benaoumeur Senouci, and all TPC members, ICAIIC 2022 is packed with an excellent mix of technical sessions. We do hope that you will take this unique opportunity to attend the technical sessions, meet the authors, and foster greater collaboration with other researchers. The Organizing Committee put a lot of effort to make this conference greatly successful and enjoyable. In addition, if you have additional time, please do not miss the chance to tour around Jeju Island. As you walk around Jeju Island in February, you'll spot the small, white apricot blossoms on trees.

We look forward to seeing you in Jeju Island and online! We also wish your active participation in the future event.

Yeong Min Jang
Kookmin Univ., Korea

Takeo FUJII
The Univ. of Electro-Comms, Japan

ICAIIC 2022

Message from TPC Chairs

It is our great pleasure to welcome all of you to Jeju Island, Korea, from Feb. 21 to 24, 2022, for the 4th International Conference on Artificial Intelligence in Information and Communication (ICAIIC). ICAIIC has addressed all aspects of artificial intelligence (AI), computing, networking, communications, and their convergence. This ICAIIC 2022 will also be a successful conference covering a wide range of topics on various AI technologies and many forms of information and communication systems with AI.

This year we have received 202 paper submissions electronically from 19 countries in the world. Many of the papers were submitted from the Asia/Pacific region, and also an increasing number of submissions were made from Europe and North America. By a rigorous review process, all papers have been reviewed by at least three independent reviewers. After the reviews and discussions, we have selected 92 technical papers for presentation at the conference. The accepted technical papers were organized into 18 technical oral sessions, which will be held in 2 parallel tracks. The program is designed to provide a broad range of AI technologies, including AI for information and communications technology, AI for image processing and multimedia, AI for Data Analysis, Big Data and Cloud, AI for eHealth and Diagnosis, AI Applications for Information System, AI Foundation, AI for Control and Decision. We also invited world-class leading researchers for keynote speeches and tutorials, and they will give us wonderful talks.

As you may be aware, the World Health Organization officially declared the novel coronavirus COVID-19 a pandemic. This global health crisis is a unique challenge that has impacted many members of the ICAIIC 2022. We would like to express our concern and support for all the members of the ICAIIC 2022 community, our professional team, our families and all others affected by this outbreak.

Along with the contributions of prominent authors from around the world, we believe that this year's valuable and interesting program is possible by the commitment of the technical program members. We are indebted to all of the 233 TPC members for their active participation and precious time. We would also like to thank our sponsors, KICS, IEEE Communications Society, and IEICE Communications Society, for their kind support of this successful event. We express our deepest gratitude to the Organizing Committee Chairs, Prof. Yeong Min Jang, Prof. Takeo Fujii, and Prof. Dong Seog Han, for their continued support and guidance. We hope that all of you will enjoy the splendid program of ICAIIC 2022 as well as the beautiful scenery and charm of Jeju.

Seokjoo Shin
Chosun Univ.,
Korea
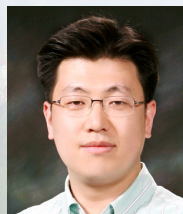
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Korea

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Program Matrix for ICAIIC 2022

February 21, 2022 (Monday)		
Room	Room A (Zoom A)	Room B (Zoom B)
10:00~12:00	ICAIIC Organizing Committee Meeting	
14:30~15:00	Registration	
15:00~16:00	Tutorial Session I - Prof. Katsuya Suto (University of Electro-Communications) Title: Deep Learning and Its Applications to Radio Map Construction Chair: Prof. Mikio Hasegawa (Tokyo University of Science)	
16:00~16:30	Break	
16:30~17:30	Session 1A: Information and Communications Technology I Chair: Prof. Wooyeol Choi (Chosun University)	Session 1B: AI for Image Processing and Multimedia I Chair: Prof. Jung Hoon Lee (Hankuk University of Foreign Studies)

February 22, 2022 (Tuesday)			
Room	Room A (Zoom A)		Room B (Zoom B)
09:00~09:30	Registration		
09:30~10:50	Session 2A: Information and Communications Technology II Chair: Prof. Senouci Ben (North Dakota State University)		Session 2B: AI for Image Processing and Multimedia II Chair: Prof. Dong Seog Han (Kyungpook National University)
10:50~11:00	Break		
11:00~11:10	Opening and Plenary Session Chair: Prof. Sang-Chul Kim (Kookmin University, Korea)		
11:00~11:10	Opening Session	Opening (Prof. Yeong Min Jang, General Chair)	
		Welcome Speech I (Prof. Yoan Shin, President of KICS)	
		Welcome Speech II (Prof. Lingyang Song, Chair of IEEE ComSoc Cognitive Network TC)	
11:10~11:40	Plenary Session	Keynote Speech I - Prof. Jinchang Ren (Robert Gordon University) Title: AI Enabled Smart Data for Smart Cities	
11:40~12:10		Keynote Speech II - Dr. Seong-Ju Kang (Vice Chair of Korea Intelligent IoT Association (KIoT) Title: AI Policy in Korea and Its Implication for Responding COVID-19 Pandemic	
12:10~14:00	Break		
14:00~15:00	Tutorial Session II - Prof. Yexiang Xue (Purdue University) Title: Knowledge Embeddings to Attack Multi-stage Inference Problems in Reasoning, Learning, and Decision Making Chair: Prof. Wansu Lim (Kumoh National Institute of Technology)		
15:00~15:20	Break		
15:20~16:40	Session 3A: Information and Communications Technology III Chair: Dr. Hui Han (Fraunhofer Institute)		Session 3B: AI for Image Processing and Multimedia III Chair: Dr. Eric Xue (University of Toronto)

Program Matrix for ICAIIC 2022

Room	Room A (Zoom A)	Room B (Zoom B)
February 23, 2022 (Wednesday)		
09:00~09:30	Registration	
09:30~10:50	Session 4A: Information and Communications Technology IV Chair: Prof. Dongkyun Kim (Kyungpook National University)	Session 4B: AI for eHealth and Medical Diagnosis I Chair: Prof. Micheal Tee (University of the Philippines Manila)
10:50~11:10	Break	
11:10~12:30	Session 5A: AI for Image Processing and Multimedia IV Chair: Prof. Hong Qin (University of Tennessee at Chattanooga)	Session 5B: AI for eHealth and Medical Diagnosis II Chair: Prof. Min Young Kim (Kyungpook National University)
12:30~14:00	Break	
14:00~14:50	Tutorial Session III - Prof. Dong Seog Han, (Kyungpook National University) Title: Facial Emotion Recognition with Deep Learning Chair: Prof. Youn-Hee Han (Korea University of Technology and Education)	
14:50~16:10	Session 6A: AI Foundation Chair: Dr. Deepesh Agarwal (Kansas State University)	Session 6B: AI for Control and Decision I Chair: Prof. Eunkyung Kim (Hanbat National University)
16:10~16:30	Break	
16:30~17:50	Session 7A: AI Applications for Information Systems I Chair: Dr. Ali Rizwan (Qatar University)	Session 7B: AI for Control and Decision II Chair: Dr. Adhitya Bantwal Bhandarkar (University of New Mexico)

Room	Room A (Zoom A)	Room B (Zoom B)
February 24, 2022 (Thursday)		
09:00~09:30	Registration	
09:30~10:50	Session 8A: AI Applications for Information Systems II Chair: Prof. Anteneh Girma (University of the District of Columbia)	Session 8B: AI for eHealth and Medical Diagnosis III Chair: Prof. Pyungsoo Kim (Korea Polytechnic University)
10:50~11:10	Break	
11:10~12:30	Session 9A: AI Applications for Information Systems III Chair: Prof. Jeong Gon Kim (Korea Polytechnic University)	Session 9B: AI for Data Analysis, Big Data and Cloud Chair: Prof. Ihsan Ullah (Korea University of Technoology and Education)
12:30~12:35	Closing Remark (Prof. Dong Seog Han, Kyungpook National Univ., President of KICS AI Society)	

Keynote Speech

February 22, 2022 (Tuesday) 11:10 ~ 11:40

Keynote Speech I (Prof. Jinchang Ren / Robert Gordon University)
AI Enabled Smart Data for Smart Cities

Abstract

Smart cities feature artificial intelligence enabled automation and decision making, which rely heavily on big data analytics based smart data applications. In this talk, applications of smart data for smart cities will be focused, including in particular big data analytics of crime and traffic data, which are from our most recent work in these areas. Useful algorithms and tools will be introduced, especially for data visualisation and demonstration, where valuable findings and conclusions in terms of the trend development, periodic terms and holiday events, will be presented to facilitate the advancement of smart cities.

Biography

Jinchang Ren (M'05, SM'17) received his B. E. degree in Computer Software, M.Eng. in Image Processing, D.Eng. in Computer Vision, all from Northwestern Polytechnical University, Xi'an, China. He was also awarded a Ph.D. in Electronic Imaging and Media Communication from the University of Bradford, Bradford, U.K. Currently he is a chair Professor of Computing Sciences, National Subsea Centre, School of Computing, Robert Gordon University, Aberdeen, UK. His research interests focus mainly on hyperspectral imaging, image processing, computer vision, big data analytics and machine learning. He has published 300+ peer reviewed journal/conferences articles, and acts as an Associate Editor for several international journals including IEEE Trans. Geoscience and Remote Sensing and J. of the Franklin Institute et al.

Keynote Speech

February 22, 2022 (Tuesday), 11:40 ~ 12:10

Keynote Speech II (Dr. Seong-Ju Kang / Vice Chair of Korea Intelligent IoT Association (KIoT))
AI Policy in Korea and Its Implication for Responding COVID-19 Pandemic

Abstract

Artificial intelligence(AI) is domination in various areas such as financing, commerce, manufacturing, and public management. Since the event of AlphaGo in 2016 many governments have developed a set of policy to promote AI in those areas including Korea.

They formed an advisory group to develop policies, including academia and business. In December of 2019 they announced an AI strategy based on recommendations from the advisory group. According the strategy, there are three pillars and nine directions. First pillar is to establish the ecology of AI such as 5G infrastructure, institution building and start-ups. The second is to utilize the potential of AI via human resource development, application to various sectors and AI-based digital government. The third is to realize human-centered AI by securing jobs and setting up new ethics. In addition these strategies could also contribute to respond COVID-19 pandemic.

Biography

Seong Ju Kang received the M.A. degree in public management from Syracuse University, and studied at Pennsylvania State University for doctoral. He spent more than three decades in IT policy arena such as AI, 5G, IoT, cyber security and digital government in Korean government and OECD. His research interests include digital transformation, metaverse, and blockchain. He is actively involving in academic activies as well such as green network technology, mobile computing, and deep learning.

Tutorial

February 21, 2022 (Monday), 15:00 ~ 16:00

Tutorial Session I (Prof. Katsuya Suto, University of Electro-Communications)

Deep Learning and Its Applications to Radio Map Construction

Abstract

Radio map plays a key role in decision-making in 6G systems, i.e., resource management for cell-free wireless networks, spatial spectrum sharing, intelligent reflecting surface (IRS). However, it remains an open challenge. Deep learning (especially image-driven deep learning) has been developing as a promising solution to express the complex radio propagation features in the urban area using feature extraction from 3D maps of cities. The approach learns the correlation between the building features and propagation features to recognize the reflection and diffraction by the buildings. By use of rapid advancement of GPU, it achieves high estimation accuracy with low computation time.

The main objective of this tutorial is to provide a fundamental background of deep learning and then show how to address practical challenges in radio map construction. In particular, we first give a tutorial of deep learning used in radio map construction to provide comprehensive knowledge to the audiences. We then give the current research trend together with implementation details to have a better understanding. Finally, we introduce our proposed methods for path loss modeling, spatial interpolation, and spatial extrapolation.

Biography

Katsuya Suto received the B.Sc. degree in computer engineering from Iwate University, Morioka, Japan, in 2011, and the M.Sc. and Ph.D. degrees in information science from Tohoku University, Sendai, Japan, in 2013 and 2016, respectively. He has worked as a Postdoctoral Fellow for Research Abroad, Japan Society for the Promotion of Science, in the Broadband Communications Research Lab., University of Waterloo, ON, Canada, from 2016 to 2018. He is currently an Assistant Professor with the Graduate School of Informatics and Engineering, the University of Electro-Communications, Tokyo, Japan. His research interests include mobile edge computing, cognitive radio, green wireless networking, and deep learning. He received the Best Paper Award at the IEEE VTC2013-spring, the IEEE/CIC ICCC2015, the IEEE ICC2016, and the IEEE Transactions on Computers in 2018.

Tutorial

February 22, 2022 (Tuesday), 14:00 ~ 15:00

Tutorial Session II (Prof. Yexiang Xue, Purdue University)

Knowledge Embeddings to Attack Multi-stage Inference Problems in Reasoning, Learning, and Decision Making

Abstract

Problems at the intersection of reasoning, optimization, and learning often involve multi-stage inference and are therefore highly intractable. I will introduce a novel computational framework, based on embeddings, to tackle multi-stage inference problems. As a first example, I present a novel way to encode the reward allocation problem for a two-stage organizer-agent game-theoretic framework as a single-stage optimization problem. The encoding embeds an approximation of the agents' decision-making process into the organizer's problem. We apply this methodology to eBird, a well-established citizen-science program for collecting bird observations, as a game called Avicaching. Our AI-based reward allocation was shown highly effective, surpassing the expectations of the eBird organizers and bird conservation experts. As a second example, I present a novel constant approximation algorithm to solve the so-called Marginal Maximum-A-Posteriori (MMAP) problem for finding the optimal policy maximizing the expectation of a stochastic objective. To tackle this problem, I propose the embedding of its intractable counting subproblems as queries to NP-oracles subject to additional XOR constraints. As a result, the entire problem is encoded as a single NP-equivalent optimization. The approach outperforms state-of-the-art solvers based on variational inference as well as MCMC sampling on probabilistic inference benchmarks, deep learning applications, as well as on a novel decision-making application in network design for wildlife conservation. Lastly, I will talk about how the embeddings of phase-field modeling in an end-to-end neural network allow us to learn partial differential equations governing the dynamics of nanostructures in metallic materials under extreme heat and irradiation conditions.

Biography

Dr. Yexiang Xue is an assistant professor at the Department of Computer Science at Purdue University, USA. The goal of Dr. Xue's research is to bridge large-scale constraint-based reasoning and optimization with state-of-the-art machine learning techniques to enable intelligent agents to make optimal decisions in high-dimensional and uncertain real-world applications. More specifically, Dr. Xue's research focuses on scalable and accurate probabilistic reasoning techniques, statistical modeling of data, and robust decision-making under uncertainty. Dr. Xue's work is motivated by key problems across multiple scientific domains, ranging from artificial intelligence, machine learning, renewable energy, materials science, crowdsourcing, citizen science, urban computing, ecology, to behavioral econometrics. Dr. Xue focuses on developing cross-cutting computational methods, with an emphasis on the areas of computational sustainability and scientific discovery. Dr. Xue received several NSF grants, Purdue's seed of success award, Cornell's Ph.D. dissertation award, and the IAAI Innovative application award. He published over 45 papers at top-tier CS conferences, and also journal articles including in Science, Nature Communications, the communications of ACM, Materials Research Society Communications, and the Artificial Intelligence magazine.

Tutorial

February 23, 2022 (Wednesday), 14:00 ~ 14:50

Tutorial Session III (Prof. Dong Seog Han, Kyungpook National University)
Facial Emotion Recognition with Deep Learning

Abstract

Facial emotion recognition (FER) is vital for interactive robots detecting users' feelings. The solid performance of the FER requires a well-designed neural network and a reliable FER dataset. Managing the FER dataset is highly effective in having a solid performance than redesigning the neural network. These days, many FER researchers are more focused on designing a deep learning model without thoroughly inspecting the FER dataset samples. In addition, the FER without improper pre-processing of the FER dataset could cause degrading the deep learning model's performance even with a well-designed neural network. Some FER datasets contain irrelevant facial images or unnecessary features, confusing a deep neural network's training. In this tutorial, we demonstrate how properly pre-process the FER dataset to enhance the overall quality of the FER dataset and improve the performance of FER's training.

Biography

Dong Seog Han received the B.S. degree in electronic engineering from Kyungpook National University (KNU), Daegu, Korea, in 1987, and the M.S. and Ph.D. degrees in electrical engineering from the Korea Advanced Institute of Science and Technology (KAIST), Daejon, Korea, in 1989 and 1993, respectively. From 1987 to 1996, he was with Samsung Electronics Company Ltd., where he developed the receiver chipset for HDTV. Since 1996, he has been with the School of Electronics Engineering, KNU, as a faculty and is currently a full Professor. He was a courtesy Associate Professor with the Department of Electrical and Computer Engineering, University of Florida, in 2004. He was the Director of the Center of Digital TV and Broadcasting, Institute for Information Technology Advancement (IITP), from 2006 to 2008. He is currently directing the Center for ICT & Autonomous Convergence, KNU, since 2011. His main research interests include intelligent signal processing and autonomous vehicles.

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Oral Sessions

Oral Session 1A: Information and Communications Technology I / February 21, 2022 (Monday)

Chair: Prof. Wooyeol Choi (Chosun University)　　　　　　　16:30-17:30, Room A/Zoom A

1A-1　Classification and Discretization of Shadowing Toward Low Storage Radio Map
Keita Katagiri (The University of Electro-Communication, Japan); Takeo Fujii (The University of Electro-Communications, Japan)

1A-2　Countering DNS Vulnerability to Attacks Using Ensemble Learning
Love Allen Ahakonye and Cosmas Ifeanyi Nwakanma (Kumoh National Institute of Technology, South Korea); Simeon Ajakwe (Kumoh National Institute of Technology, Gumi, South Korea); Dong Seong Kim and Jae Min Lee (Kumoh National Institute of Technology, South Korea)

1A-3　NetMD-Network Traffic Analysis and Malware Detection
Sampath Kumar Katherasala and Sri Manvith Vaddeboyina (Tata Consultancy Services, India); Ajay Therala (TATA Consultancy Services, India)

1A-4　Defect Information Synthesis via Latent Mapping Adversarial Networks
Seunghwan Song and Jun-Geol Baek (Korea University, South Korea)

1A-5　FFDNet Based Channel Estimation for Multiuser Massive MIMO System with One-Bit ADCs
Md. Habibur Rahman, Md. Shahjalal and Yeong Min Jang (Kookmin University, South Korea)

Oral Session 1B: AI for Image Processing and Multimedia I / February 21, 2022 (Monday)

Chair: Prof. Jung Hoon Lee (Hankuk University of Foreign Studies)　　　16:30-17:30 Room B/Zoom B

1B-1　iVoiding: A Thermal-Image based Artificial Intelligence Dynamic Voiding Detection System
Yu-Chen Chen (Kaohsiung Medical University, Kaohsiung, Taiwan); Jian-Ping Su (Southern Taiwan University of Science and Technology, Taiwan); Cheng Han Tsai (Southern Taiwan University of Science and Technology, Tainan, Taiwan); Ming-Che Chen and Wan-Jung Chang (Southern Taiwan University of Science and Technology, Taiwan); Wen-Jeng Wu (Kaohsiung Medical University, Kaohsiung, Taiwan)

1B-2　Determining Jigsaw Puzzle State from an Image based on Deep Learning
Ijaz Ahmad, Suk-seung Hwang and Seokjoo Shin (Chosun University, South Korea)

1B-3　Growth Estimation Sensor Network System for Aquaponics using Multiple Types of Depth Cameras
Ryota Murakami and Hiroshi Yamamoto (Ritsumeikan University, Japan)

1B-4　Image Synthesis with Single-type Patterns for Mixed-type Pattern Recognition on Wafer Bin Maps
Yunseon Byun (Korea University, Republic of Korea, South Korea); Jun-Geol Baek (Korea University, South Korea)

1B-5　Evaluating Opcodes for Detection of Obfuscated Android Malware
Saneeha Khalid (Bahria University Islamabad Pakistan, Pakistan); Faisal Bashir Hussain (Bahria University, Islamabad, Pakistan)

Oral Sessions

Oral Session 2A: Information and Communications Technology II / February 22, 2022 (Tuesday)

Chair: Prof. Senouci Ben (North Dakota State University)　　　　　09:30-10:50 Room A/Zoom A

2A-1 Procedural Generation of Game Levels and Maps: A Review
Tianhan Gao (Northeastern University of China, China); Jin Zhang and Qingwei Mi (Northeastern University, China)

2A-2 Similarity-based Local Feature Extraction for Wafer Bin Map Pattern Recognition
Jieun Kim and Jun-Geol Baek (Korea University, South Korea)

2A-3 Body Segmentation Using Multi-task Learning
Julijan Jug and Ajda Lampe (University of Ljubljana, Faculty of Computer and Information Science, Slovenia); Vitomir Štruc (Faculty of Electrical Engineering, University of Ljubljana, Slovenia); Peter Peer (University of Ljubljana, Faculty of Computer and Information Science, Slovenia)

2A-4 Aerial Supervision of Drones and Birds using Convolutional Neural Networks
Vivian Ukamaka Ihekoronye (Kumoh National Institute of Technology, South Korea); Simeon Ajakwe (Kumoh National Institute of Technology, Gumi, South Korea); Dong Seong Kim and Jae Min Lee (Kumoh National Institute of Technology, South Korea)

2A-5 Performance Analysis of UAV-based Array Antenna Arrangement for Target Detection
Ji-Hyeon Kim, Soon-Young Kwon and Hyoung-Nam Kim (Pusan National University, South Korea)

Oral Session 2B: AI for Image Processing and Multimedia II / February 22, 2022 (Tuesday)

Chair: Prof. Dong Seog Han (Kyungpook National University)　　　　　09:30-10:50 Room B/Zoom B

2B-1 Image Prediction for Lane Following Assist using Convolutional Neural Network-based U-Net
Byung Chan Choi (LIG Nex1, South Korea); Jaerock Kwon (University of Michigan - Dearborn, USA); Haewoon Nam (Hanyang University, South Korea)

2B-2 Forward and Backward Warping for Optical Flow-Based Frame Interpolation
Joi Shimizu, Heming Sun and Jiro Katto (Waseda University, Japan)

2B-3 Performance Improvement Method of the Video Visual Relation Detection with Multi-modal Feature Fusion
Kwangju Kim and Pyong-Kun Kim (ETRI, South Korea); Kil-Taek Lim (Electronics and Telecommunications Research Institute, South Korea); Jong Taek Lee (ETRI, South Korea)

2B-4 A high-speed driver behavior detection deep learning system using the amount of change in contrast between frames
Min Woo Yoo and Dong Seog Han (Kyungpook National University, South Korea)

2B-5 Intelligent Receiver for Optical Camera Communication
Ida Bagus Krishna Yoga Utama, Md Rahman and Yeong Min Jang (Kookmin University, South Korea)

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Oral Sessions

Oral Session 3A: Information and Communications Technology III / February 22, 2022 (Tuesday)

Chair: Dr. Hui Han (Fraunhofer Institute) **15:20-16:40 Room A/Zoom A**

3A-1 Interference analysis study for coexistence between C-V2X and Wi-FI 6E in the 6GHz band
YoungWoon Kim (Soongsil University, South Korea)

3A-2 Neural Architecture Search for Real-Time Driver Behavior Recognition
Jaeho Seong and Dong Seog Han (Kyungpook National University, South Korea)

3A-3 Smart Anomaly Detection: Deep Learning modeling Approach and System Utilization Analysis
Ben Senouci (North Dakota State University (NDSU), USA); Mourad Bouache (Intel USA, USA)

3A-4 An Evaluation Framework for Machine Learning Methods in Detection of DoS and DDoS Intrusion
Temechu G Zewdie and Anteneh Girma (University of the District of Columbia, USA)

3A-5 A study on the application of mission-based cybersecurity testing and evaluation of weapon systems
Dongkyoo Shin and Ikjae Kim (Sejong University, South Korea)

Oral Session 3B: AI for Image Processing and Multimedia III / February 22, 2022 (Tuesday)

Chair: Dr. Eric Xue (University of Toronto) **15:20-16:40 Room B/Zoom B**

3B-1 Grey Wolf Optimizer-Based Automatic Focusing for High Magnification Systems
Islam Helmy and Wooyeol Choi (Chosun University, South Korea)

3B-2 Research and examination on implementation of super-resolution models using deep learning with INT8 precision
Shota Hirose, Naoki Wada, Jiro Katto and Heming Sun (Waseda University, Japan)

3B-3 Mitigating Overflow of Object Detection Tasks Based on Masking Semantic Difference Region of Vision Snapshot for High Efficiency
Heuijee Yun (Kyungpook National University, South Korea); Daejin Park (Kyungpook National University (KNU), South Korea)

3B-4 Calibration-Net: LiDAR and Camera Auto-Calibration using Cost Volume and Convolutional Neural Network
An Duy Nguyen and Myungsik Yoo (Soongsil University, South Korea)

3B-5 Granular Analysis of Pretrained Object Detectors
Eric Xue (University of Toronto, Canada); Tae Soo Kim (Johns Hopkins University, USA)

Oral Sessions

Oral Session 4A: Information and Communications Technology IV / February 23, 2022 (Wednesday)

Chair: Prof. Dongkyun Kim (Kyungpook National University)　　　　09:30-10:50 Room A/Zoom A

4A-1 Irregular Repetition Slotted ALOHA Scheme with Multi-Packet Reception in Packet Erasure Channel
Chundie Feng (Chongqing University, China); Xuhong Chen (China Development Bank, China); Zhengchuan Chen, Zhong Tian and Yunjian Jia (Chongqing University, China); Min Wang (Chongqing University of Posts and Telecommunications, China)

4A-2 Two-Policy Cooperative Transfer for Alleviation of Sim-to-Real Gap
Liangdong Wu (Institute of Automation, Chinese Academy of Sciences, China)

4A-3 Graph Neural Network-based Clustering Enhancement in VANET for Cooperative Driving
Hang Hu (City College of New York, USA); Myung Lee (City University of New York, City College, USA)

4A-4 Machine Learning-Based Power Loading for Massive Parallel Gaussian Channels
Min Jeong Kang and Jung Hoon Lee (Hankuk University of Foreign Studies, South Korea)

4A-5 Enhanced Semi-persistent scheduling (e-SPS) for Aperiodic Traffic in NR-V2X
Malik Muhammad Saad, Muhammad Ashar Tariq, Md. Mahmudul Islam, Muhammad Toaha Raza Khan, Junho Seo and Dongkyun Kim (Kyungpook National University, South Korea)

4A-6 Target Detection using U-Net for a DTV-based Passive Bistatic Radar System
Ji-Hun Park, Do-Hyun Park and Hyoung-Nam Kim (Pusan National University, South Korea)

Oral Session 4B: AI for eHealth and Medical Diagnosis I / February 23, 2022 (Wednesday)

Chair: Prof. Micheal Tee (University of the Philippines Manila)　　　　09:30-10:50 Room B/Zoom B

4B-1 Privacy-preserving collaborative machine learning in biomedical applications
Wonsuk Kim and Junhee Seok (Korea University, South Korea)

4B-2 Computer Code Representation through Natural Language Processing for fMRI Data Analysis
Jaeyoon Kim (Korea University, South Korea); Una-May O'Reilly (MIT, USA); Junhee Seok (Korea University, South Korea)

4B-3 A Machine Learning Approach in Evaluating Symptom Screening in Predicting COVID-19
Geoffrey A. Solano (University of the Philippines Manila, Philippines); Marc Jermaine Pontiveros (University of the Philippines Manila & University of the Philippines Diliman, Philippines); Michael L. Tee (University of the Philippines Manila, Philippines)

4B-4 A Study on the Clinical Effectiveness of Deep Learning CAD Technology
Ju-Hyuck Han, Hyun-Woo Oh and Woong-Sik Kim (Konyang University, South Korea)

4B-5 Fake Data Generation for Medical Image Augmentation using GANs
Donghwan Kim, Jaehan Joo and Suk Chan Kim (Pusan National University, South Korea)

Oral Sessions

Oral Session 5A: AI for Image Processing and Multimedia IV / February 23, 2022 (Wednesday)

Chair: Prof. Hong Qin (University of Tennessee at Chattanooga)　　　　11:10-12:30 Room A/Zoom A

5A-1　Vision Anomaly Detection Using Self-Gated Rectified Linear Unit
Israt Jahan, Md. Osman Ali, Md. Habibur Rahman and Yeong Min Jang (Kookmin University, South Korea)

5A-2　A Comparison of YOLO and Mask-RCNN for Detecting Cells from Microfluidic Images
Mehran Ghafari (University of Tennessee Chattanooga, USA); Daniel Mailman, Parisa Hatami, Trevor Peyton and Li Yang (University of Tennessee at Chattanooga, USA); Weiwei Dang (Baylor Collage of Medicine, USA); Honq Qin (University of Tennessee at Chattanooga, USA)

5A-3　Multiview Attention for 3D Object Detection in Lidar Point Cloud
Kevin T. Wijaya, Donghee Paek and Seung-Hyun Kong (Korea Advanced Institute of Science and Technology, South Korea)

5A-4　Multi-scale synergy approach for real-time semantic segmentation
Min Young Kim and Quyen Van Toan (Kyungpook National University, South Korea)

5A-5　CIAFill: Lightweight and Fast Image Inpainting with Channel Independent Attention
Chung-Il Kim (Korea Electronics Technology Institute, South Korea); Saim Shin (KETI, South Korea); Han-Mu Park (Korea Electronics Technology Institute, South Korea)

Oral Session 5B: AI for eHealth and Medical Diagnosis II / February 23, 2022 (Wednesday)

Chair: Prof. Min Young Kim (Kyungpook National University)　　　　11:10-12:30 Room B/Zoom B

5B-1　Anomaly Detection for Alzheimer's Disease in Brain MRIs via Unsupervised Generative Adversarial Learning
Geoffrey A. Solano and Sun Arthur A. Ojeda (University of the Philippines Manila, Philippines)

5B-2　Heart Disease Prediction Using Adaptive Infinite Feature Selection and Deep Neural Networks
Sudipta Modak, Esam Abdel-Raheem and Luis Rueda (University of Windsor, Canada)

5B-3　A federated binarized neural network model for constrained devices in IoT healthcare services
Hyeontaek Oh, Jongmin Yu, Nakyoung Kim, Dongyeong Kim and Jangwon Lee (KAIST, South Korea); Jinhong Yang (INJE University & Korea Advanced Institute of Science Technology, South Korea)

5B-4　Hierarchical User Status Classification for Imbalanced Biometric Data
Nakyoung Kim (KAIST, South Korea); Hyunseo Park (Korea Advanced Institute of Science and Technology (KAIST), South Korea); Gyeong Ho Lee, Jaeseob Han, Hyeontaek Oh and Jun Kyun Choi (KAIST, South Korea)

5B-5　Increasing Accuracy of Hand Gesture Recognition using Convolutional Neural Network
Gyutae Park and Chandrasegar Vasantha Kumar (Gyeongsang National University, South Korea); JoongGun Park (JD Co., Ltd, South Korea); Jinhwan Koh (Gyeongsang National University, South Korea)

Oral Sessions

Oral Session 6A: AI Foundation / February 23, 2022 (Wednesday)

Chair: Dr. Deepesh Agarwal (Kansas State University) 14:50-16:10 Room A/Zoom A

6A-1 Impacts of Behavioral Biases on Active Learning Strategies
Deepesh Agarwal (Kansas State University, USA); Obdulia Covarrubias and Stefan Bossmann (The University of Kansas Medical Center, USA); Bala Natarajan (Kansas State University, USA)

6A-2 Effect of the Period of the Fourier Series Approximation for Binarized Neural Network
Seon-Yong Lee, Hee-Youl Kwak and Jong-Seon No (Seoul National University, South Korea)

6A-3 CMCL: Clustering-based Memory Management for Continual Learning
Jiae Yoon (GIST, South Korea); Hyuk Lim (Gwangju Institute of Science and Technology, South Korea)

6A-4 TinyML: A Systematic Review and Synthesis of Existing Research
Hui Han (Fraunhofer Institute for Experimental Software Engineering IESE, Germany); Julien Siebert (Fraunhofer Institut for Experimental Software Engineering IESE, Germany)

6A-5 A Survey of Procedural Content Generation of Natural Objects in Games
Tianhan Gao (Northeastern University of China, China); Jiahui Zhu (Northeastern University, China)

Oral Session 6B: AI for Control and Decision I / February 23, 2022 (Wednesday)

Chair: Prof. Eunkyung Kim (Hanbat National University) 14:50-16:10 Room B/Zoom B

6B-1 Reinforcement Learning for Neural Collaborative Filtering
Alexandros I Metsai (My Company Projects, Greece); Konstantinos Karamitsios and Konstantinos Kotrotsios (My Company Projects O. E., Greece); Periklis Chatzimisios (International Hellenic University (Greece), Greece & University of New Mexico (USA), USA); George Stalidis and Kostas Goulianas (International Hellenic University, Greece)

6B-2 A Survey of Markov Model in Reinforcement Learning
Tianhan Gao (Northeastern University of China, China); Baicheng Chen (Northeastern University & Arlinton University, China); Qingwei Mi (Northeastern University, China)

6B-3 Fairness Enhancement of TCP Congestion Control Using Reinforcement Learning
Sang-Jin Seo and You-Ze Cho (Kyungpook National University, South Korea)

6B-4 Merging Reinforcement Learning and Inverse Reinforcement Learning via Auxiliary Reward System
Wadhah Zeyad Tareq and M. Fatih Amasyalı (Yıldız Technical University, Turkey)

6B-5 Pothole Detection Using Optical Camera Communication
Md. Osman Ali, Israt Jahan, Raihan Bin Mofidul and Yeong Min Jang (Kookmin University, South Korea)

Oral Sessions

Oral Session 7A: AI Applications for Information Systems I / February 23, 2022 (Wednesday)

Chair: Dr. Ali Rizwan (Qatar University)   **16:30-17:50 Room A/Zoom A**

7A-1   Sensor Network System for Condition Detection of Harmful Animals by Step-by-step Interlocking of Various Sensors
Keigo Uchiyama and Hiroshi Yamamoto (Ritsumeikan University, Japan); Eiji Utsunomiya (KDDI Research, Japan); Kiyohito Yoshihara (KDDI Research Inc., Japan)

7A-2   WiFi Positioning by Optimal k-NN in 3GPP Indoor Office Environment
Sung Hyun Oh and Jeong Gon Kim (Korea Polytechnic University, South Korea)

7A-3   A Study on the improvement of chinese automatic speech recognition accuracy using a lexicon
Minjeong Gu (University of Science and Technology & Electronics and Telecommunications Research Institute, South Korea); Shingak Kang (Electronics and Telecommunication Research Institute, South Korea)

7A-4   Addressing Data Sparsity with GANs for Multi-fault Diagnosing in Emerging Cellular Networks
Ali Rizwan (University of Glasgow, United Kingdom (Great Britain)); Adnan Abu-Dayya and Fethi Filali (QMIC, Qatar); Ali Imran (University of Oklahoma, USA)

7A-5   Edge-Computing based Secure E-learning Platforms
Sameer Ahmad Bhat (Gulf University for Science and Technology, Kuwait); Muneer Dar (National Institute of Electronics & Information Technology, Srinagar, India); Saadiya Shah (National Institute of Electronics and Information Technology, Kuwait)

7A-6   Efficient classification of human activity using PCA and deep learning LSTM with WiFi CSI
Sang-Chul Kim and Yong-Hwan Kim (Kookmin University, South Korea)

Oral Session 7B: AI for Control and Decision II / February 23, 2022 (Wednesday)

Chair: Dr. Adhitya Bantwal Bhandarkar (University of New Mexico)   **16:30-17:50 Room B/Zoom B**

7B-1   MARL-based Optimal Route Control in Multi-AGV Warehouses
Ho-Bin Choi, Ju-Bong Kim, Chang-Hun Ji, Ihsan Ullah and Youn-Hee Han (Korea University of Technology and Education, South Korea); Se Won Oh (ETRI, South Korea); Kwi-Hoon Kim (Korea National University of Education, South Korea); Cheol Sig Pyo (ETRI, South Korea)

7B-2   DDPG-Edge-Cloud: A Deep-Deterministic Policy Gradient based Multi-Resource Allocation in Edge-Cloud System
Arslan Qadeer (City College of New York, CUNY, USA); Myung Lee (City University of New York, City College, USA)

7B-3   A Study on Update Frequency of Q-Learning-based Transmission Datarate Adaptation using Redundant Check Information for IEEE 802.11ax Wireless LAN
Kazuto Yano, Kenta Suzuki and Babatunde Ojetunde (Advanced Telecommunications Research Institute International (ATR), Japan); Koji Yamamoto (Kyoto University, Japan)

Oral Sessions

7B-4   User Coverage Maximization for a UAV-mounted Base Station Using Reinforcement Learning and Greedy Methods
Adhitya Bantwal Bhandarkar (University of New Mexico, USA); Sudharman K Jayaweera (University of New Mexico & Bluecom Systems, USA); Steven Lane (Air Force Research Laboratory, USA)

7B-5   SVR-based Blind Equalization on HF Channels with a Doppler Spread
Soon-Young Kwon, Ji-Hyeon Kim and Hyoung-Nam Kim (Pusan National University, South Korea)

Oral Session 8A: AI Applications for Information Systems II / February 24, 2022 (Thursday)

Chair: Prof. Anteneh Girma (University of the District of Columbia)   **09:30-10:50 Room A/Zoom A**

8A-1   Resolving Camera Position for a Practical Application of Gaze Estimation on Edge Devices
Linh Van Ma and Tin Trung Tran (Gwangju Institute of Science and Technology, South Korea); Moongu Jeon (Gwangju Institute of Science and Technology (GIST), South Korea)

8A-2   Throughput Prediction by Radio Environment Correlation Recognition Using Crowd Sensing and Federated Learning
Satoshi Nakaniida and Takeo Fujii (The University of Electro-Communications, Japan)

8A-3   Thermal Array Sensor Resolution-Aware Activity Recognition using Convolutional Neural Network
Goodness Oluchi Anyanwu, Cosmas Ifeanyi Nwakanma, Adinda Riztia Putri, Jae Min Lee and Dong Seong Kim (Kumoh National Institute of Technology, South Korea)

8A-4   An Investigation on Deep Learning-Based Activity Recognition Using IMUs and Stretch Sensors
Nguyen Thi Hoai Thu and Dong Seog Han (Kyungpook National University, South Korea)

8A-5   Comparative analysis of solar power generation prediction system using deep learning
So-yeong Kim and Eun-ji Lee (Chosun University, South Korea); Uttam Khatri (Chosun University, Nepal); Seokjoo Shin, Ji-In Kim and Goo-Rak Kwon (Chosun University, South Korea)

Oral Session 8B: AI for eHealth and Medical Diagnosis III / February 24, 2022 (Thursday)

Chair: Prof. Pyungsoo Kim (Korea Polytechnic University)   **09:30-10:50 Room B/Zoom B**

8B-1   Multi-head CNN and LSTM with Attention for User Status Estimation from Biometric Information
Hyunseo Park (Korea Advanced Institute of Science and Technology (KAIST), South Korea); Nakyoung Kim, Gyeong Ho Lee, Jaeseob Han and Hyeontaek Oh (KAIST, South Korea); Jun Kyun Choi (Korea Advanced Institute of Science and Technology (KAIST), South Korea)

8B-2   An Explainable Computer Vision in Histopathology: Techniques for Interpreting Black Box Model
Subrata Bhattacharjee, Hwang-Byn Yeong, Kobiljon Ikromjanov, Rashadul Islam Sumon, Hee-Cheol Kim and Heung-Kook Choi (Inje University, South Korea)

8B-3   Whole Slide Image Analysis and Detection of Prostate Cancer using Vision Transformers
Kobiljon Ikromjanov, Subrata Bhattacharjee, Hwang-Byn Yeong, Rashadul Islam Sumon, Hee-Cheol Kim and Heung-Kook Choi (Inje University, South Korea)

Oral Sessions

8B-4   A Generative Adversarial Network Approach to Metastatic Cancer Cell Images
Seohyun Lee, Hyuno Kim and Hideo Higuchi (The University of Tokyo, Japan); Masatoshi Ishikawa (University of Tokyo, Japan); Ryuichiro Nakato (Institute of Quantitative Bioscience, Japan)

8B-5   UIRNet: Facial Landmarks Detection Model with Symmetric Encoder-Decoder
Savina Colaco, Young Jin Yoon and Dong Seog Han (Kyungpook National University, South Korea)

Oral Session 9A: AI Applications for Information Systems III / February 24, 2022 (Thursday)

Chair: Prof. Jeong Gon Kim (Korea Polytechnic University)   11:10-12:30 Room A/Zoom A

9A-1   Design and Analysis of an Efficient Energy Sharing System among Electric Vehicles using Evolutionary Game Theory
MD Rizwanul Kabir, Muhammad Mutiul Muhaimin and Abrar Mahir (Islamic University of Technology (IUT), Bangladesh); Habibul Khondokar Kabir (Islamic University of Technology (IUT), Japan)

9A-2   GAN-based Data Augmentation for UWB NLOS Identification Using Machine Learning
Duc Hoang Tran and Yeong Min Jang (Kookmin University, South Korea)

9A-3   BER Minimization by User Pairing in Downlink NOMA Using Laser Chaos-Based MAB Algorithm
Masaki Sugiyama, Aohan Li and Zengchao Duan (Tokyo University of Science, Japan); Makoto Naruse (The University of Tokyo, Japan); Mikio Hasegawa (Tokyo University of Science, Japan)

9A-4   Hybrid Energy Management Systems based on Edge Processing for Electric Transportation Applications
Henar Canilang (Kumoh National Institute of Technology, South Korea); Danielle Jaye S. Agron (Kumoh National Institute of Technology, South Korea, South Korea); Wansu Lim (Kumoh National Institute of Technology, South Korea)

9A-5   Studies on Intelligent Curation for the Korean Traditional Cultural Heritage
Jae-Ho Lee (Electronics and Telecomunications Researh Institute: ETRI, South Korea); Hee-Kwon Kim and Chan-woo Park (Electronics and Telecommunications Research Institute, South Korea)

Oral Session 9B: AI for Data Analysis, Big Data and Cloud / February 24, 2022 (Thursday)

Chair: Prof. Ihsan Ullah (Korea University of Technoology and Education)   11:10-12:30 Room B/Zoom B

9B-1   Community Detection with Graph Neural Network using Markov Stability
Chao Wang (Xidian University, China); Shunjie Yuan (University of Xidian, China)

9B-2   Exploiting Heterogeneous Monitoring Data for Spatiotemporal Algal Bloom Prediction
Taewhi Lee and Miyoung Jang (ETRI, South Korea); Jang-Ho Choi (Electronics and Telecommunications Research Institute, South Korea); Jong Ho Won and Jiyong Kim (ETRI, South Korea)

9B-3   Three-dimensional Data Outlier Detected by Angle Analysis
Zhongyang Shen (China Mobile, China)

Oral Sessions

9B-4 Identification and Analysis of COVID-19-related Misinformation Tweets via Kullback-Leibler Divergence for Informativeness and Phraseness and Biterm Topic Modeling
Thomas Daniel S. Clamor and Geoffrey A. Solano (University of the Philippines Manila, Philippines);
Nathaniel Oco (De La Salle University, Philippines); Jasper Kyle Catapang (University of Birmingham,
United Kingdom (Great Britain)); Jerome Cleofas (De La Salle University, Philippines);
Iris Thiele Isip-Tan (University of the Philippines Manila, Philippines)

9B-5 Blockchain based Secure Data Exchange between Cloud Networks and Smart Hand-held Devices for use in Smart Cities
Muneer Dar (National Institute of Electronics & Information Technology, Srinagar, India);
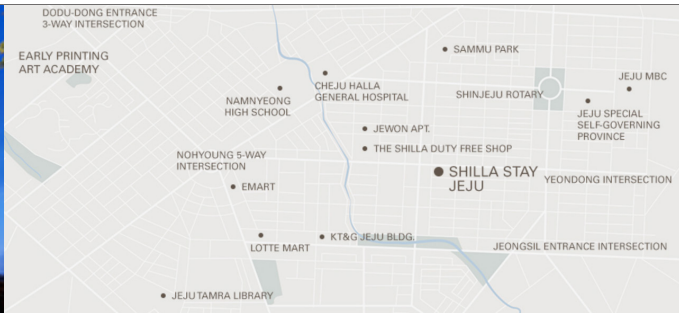*Sameer Ahmad Bhat (Gulf University for Science and Technology (GUST), Mehref, Kuwait)*

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Venue

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Travel Information

Hallasan National Park

Hallasan stands out at the center of South Korea's southernmost island, boasting exquisite landscapes due to its varied volcanic topography and vegetation distribution ranging vertically through the subtropical, temperate, frigid and alpine zones. The special nature of this area led to its being designated and managed as a national park in 1970, a UNESCO Biosphere Reserve in 2002, a World Natural Heritage Site in 2007. Muljangori Oreum registered as a Ramsar Wetland in 2008.

Jeju Olle

"Olle" [Ole] is the Jeju word for a narrow pathway that is connected from the street to the front gate of a house. Hence, "Olle" is a path that comes out from a secret room to an open space and a gateway to the world. If the road is connected, it is linked to the whole island and the rest of the world as well. It has the same sound as "Would you come?" in Korean, so Jeju's "Olle" sounds the same as 'Would you come to Jeju?'.

Jeju Olle's founder Suh, Myungsook used to be the chief editor of a weekly news magazine. She worked hard as a journalist, but after struggling to reach her dream job for twenty years and then being at the top of her profession for another fifteen years, she needed a rest. She was exhausted and her mind felt empty, so she set herself a new goal. She hoped that she could walk the road to Santiago (Camino de Santiago – 800km pilgrimage from France to Spain). Eventually she made her pilgrimage in September, 2006. She met a British woman at the end of the trip and they promised to share their comforts and happiness on the road with others when they returned to their homelands….

Udo (Cow Islet)

The island was named "Udo" or "Cow Island" as its contours look like a cow lying down on the ground. There are 8 scenic wonders of Udo: day and night(Judan-myeongwol and Yahang-eobeom), sky and earth (Cheonjin-gwansan and Jidu-cheongsa), front and back (Jeonpo-mangdo and Huhae-seokbyeok), and east and west (Dongan-gyeonggul and Seobin-baeksa)

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Travel Information

Mysterious Road (Dokkaebi Road)

On Mysterious Road (or Bugaboo Road), a parked car on a slight hill road rolls uphill instead of going down hill. This is a result of an optical illusion in which the lower part looks higher because of its surrounding environment.

Geomun Oreum

The eroded valley of lava that erupted from the middle of the crater is the largest on Jeju Island. On one side is a 4km oval valley.

On the southeast ranch site, there are many conical hills with lava detritus which are volcanic cones without craters. The Geomi Oreum in Songdang-ri, Gujwa-eup is also called the East Geomun Oreum to distinguish it from this West Geomun Oreum.

Local residents call it Geomul Chang (Geomeol Chang) or the Geomun Oreum since it looks black when covered with forest. However, according to a scholars etymological study, "Geomun" originates from "Gam or Geom" during the Ancient Joseon Era which means "God". Therefore, "Geomun Oreum" means "Holy mountain". The forest is thick with Pinus thunbergii and Japanese cedars. It is a multiple-shaped volcanic cone. On the top of the mountain, there is a large crater with a small peak with a horse hoof-shaped crater that widens to the northeast.

Manjang Cave

Manjang Cave, situated at Donggimnyeong-ri, Gujwa-eup, North Jeju, 30 kilometers east of Jeju City, was designated as Natural Monument No. 98 on March 28, 1970. The 7,416-meter long cave has been officially recognized as the longest lava tube in the world. The annual temperature inside the cave ranges from 11oC to 21oC, thus facilitating a favorable environment throughout the year. The cave is also academically significant

as rare species live in the cave. Created by spewing lava, "the lava turtle", "lava pillar", and "Wing-shaped Wall" look like the work of the gods. It is considered to be a world class tourist attraction.

Travel Information

Sanbang Cave buddhist temple

A Buddhist statue is enshrined in a cave on the southwestern slope of Mt. Sanbang. With a height of 5 m, a length of 10 m and a width of 5 m, it is not known when this statute was carved. It is said to have been Heil residence during the Goreyo Dynasty andthe calligrapher Chusa Jeong-hee Kim often visited here to contemplate life. Water drips from the ceiling and some Jeju people say the water droplets are tears of goddess Sanbangdeok who guards the mountain.

Legend has it that this daughter of Mt. Sanbang was gorgeous.

She fell in love with a youth named Goseong but an official in town who had a crush on her confiscated his property and falsely put him into exiled him. Disappointed and despairing of the world rife with sins, Sanbangdeok returned to the Sanbang cave, turned herself into a rock, and continues to weep to this day.

Seopjikoji

Jutting out at the eastern seashore of Jeju Island, Seopji-Koji is one of the most scenic views with the bright yellow canola and Seongsan Sunrise Peak as a backdrop.

The pristine beauty of Jeju can be seen in Seopji-koji. Sinyang Beach, a meadow filled with canola flowers, peacefully grazing Jeju ponies, a rocky sea cliff, and a towering legendary large rock (Sunbawe) all combine to make nature s masterpiece. Unlike the other coastal areas of Jeju, it has red volcanic rock (songi) and strangely-shaped rocks that at low tide transform this area into a breath-taking stone exhibition gallery.

Seopji-Koji has become a movie and drama location hotspot with Gingko Bed 2, The Uprising of Lee Jae Su, Thousand Day Night, and All In

-A location shot was taken at Seopji-Koji to portray a picturesque scene of seaside home where the actress Jin Sil Choi lived in the movie Gingko Bed 2 (Danjeokbiyeonsu). It is also well-known as the shooting location for the TV drama All In, The Hyeopja beacon mound and lighthouse attracts a lot of tourists.

5.16 Road's Forest Tunnel

Highway 5.16 was the first national road in Jeju which directly linked Jeju City to Seogwipo City, reducing the travel time between the southern and northern parts of the island to less than one hour. Naturally forming a tunnel, a line of trees on each side along the highway stretches for about 1 km just south of Seongpanak. Snow in winter and the brilliant red and yellow leaves in autumn make this drive a mystical experience.

Travel Information

Seongsan Ilchulbong (Sunrise Peak)

99 rocky peaks surround the crater like a fortress and the gentle southern slope connected to water is a lush grassland.

On the grassland at the entrance of Sunrise Peak, you can enjoy horseback riding. Breathtaking scenic views while taking a rest in the middle of climbing up the peak such as Mount Halla, the deep blues of the ocean, the multi-colored coast line, and the picturesque neighboring villages will become unforgettable memories.

Cheonjiyeon Waterfall

The waterfall falls from a precipice with thundering sounds, creating white water pillars. It has the name Cheonjiyon, meaning 'the heaven and the earth meet and create a pond'. At 22 m in height and 12 min width, the waterfall tumbles down to the pond to produce awe-inspiring scenery. The valley near the waterfall is home to Elaeocarpus sylvestrisvar, ellipticus, which is Natural Monument No. 163, Psilotum nudum, Castanopsis cuspidatavar.sieboldii, Xylosma congestum, Camellia and other subtropical trees. This place is also famous as home to the eel of Anguilla mauritiana, whichis Natural Monument No. 27 and is active primarily at night.

The Chilsipri Festival is held in every September at the falls.>

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