EEECS 2022
Program and Abstracts

The 10th International Conference on Electronics,
Electrical Engineering, Computer Science 2022

July 20-22, 2022
Jeju, Korea

10ᵗʰ EEECS2022
JEJU KOREA

Sponsored by

Korea Culture & Contents Technology Association (KOCTA), Immersive Content Display Center (ICDC),
Computer and Communication Engineering for Capacity Building (CCC), Digital Virtual Convergence Technology Center
(DVCTC)

Contents

1   Messages

1.1 Message from General Chair

It is a great pleasure for me to welcome you to the 10th International Conference on Electronics, Electrical Engineering, Computer Science (10th EEECS 2021) from July 20 to July 22, 2022. This year's conference marks the tenth EEECS starting from 2016. The EEECS is a conference of the Korea Culture & Contents Technology Association (KOCTA) and represents large number of gatherings of researchers and industry professionals in the corresponding fields.

This year's conference brings together more than 70 delegates from around the Asian countries to discuss the latest advances in this vibrant and constantly evolving field. The topics covered in the program include overall areas in Electronics, Electrical Engineering, and Computer Science. In line with recent research trends, many artificial intelligence-related papers have been accepted with the diligent work of the technical program committee.

2022 has been a very challenging year due to the advent of the COVID-19 endemic, the world environment has become complicated again. Due to the COVID-19 spread out, it has been converted to a hybrid conference. Nonetheless this difficulty situation, the committee would thank all participants and paper authors contributing this conference more active. Through this hybrid conference platform, EEECS 2022 continues to share an insight into the recent research and cutting-edge technologies in those fields of ICT.

This event has been made up by many volunteers who contributed to the various processes and it would not be possible for me to name all of them in this short message. In particular, the Technical Program Committee, led by our indefatigable TPC Chairs and supported by the TPC members, completed a thorough peer-review process of technical and special session papers to select a comprehensive and high-quality technical program for the conference. This program is augmented and complemented by three Keynote Speeches, four special sessions and several regular sessions. In addition, all Organizing Committees worked tirelessly to ensure the best quality experience for the delegates during the technical sessions and the social programs.

Also, I would like to thank the groups of KOCTA and ICDC, Kwangwoon University, Digital Virtual Convergence Technology Center (DVCTC) Namseoul University, in Korea, and CCC, Mae Fah Luang University. Next EEECS will be scheduled to have events at Chiang Mai University in December 19-22, 2022. I would like to ask for your interest and support in preparing this event. Finally, I would also like to thank all participants and supporters for their contribution to the conference. It is a fantastic experience for me to serve as the General Chair of EEECS2022 and it is my hope that you find the conference stimulating, fulfilling and enjoyable. Please enjoy the conference!

10th EEECS 2022 General Chair

Taek Keun Hwangbo

2   Committee

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Hae Chul Choi, Hanbat National University, Korea
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Hui Xia, Qingdao University, China
Je Ho Park, Dankook University, Korea
Jia Zhao, Nanchang Institute of Technology, China
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Yongsoo Choi, Sungkyul University, Korea

Young Choong Park, KETI, Korea
Young Ho Seo, Mokwon University, Korea
Jeong-Geun Kim, Kyungpook National University, Korea
Jeong-Dong Kim, Sun Moon University, Korea

3   Keynote Speeches

Wednesday, 20th July 2022, 16:30 – 17:00

COMBINATION OF GAN WITH INTERACTIVE EVOLUTIONARY COMPUTATION TO DESIGN OBJECTS

Prof. Kaoru Arakawa
Meiji University, Japan

Abstract

Generative adversarial networks (GANs) are a powerful tool for image generation. It can generate realistic images, being helpful to design shapes and colors of objects in images. However, since the object is designed automatically by computation, it is hard to reflect the user's preference in the design. On the other hand, interactive evolutionary computation (IEC) is well known as a technique which can reflect the user's preference in designing objects on computers. In IEC, the parameters of the shapes and colors of objects are represented as numerical series, which correspond to chromosomes in genetic algorithm (GA), and are optimized on the basis of the user's subjective assessment by human interaction. Thus, object design can be realized more powerfully by combining GAN with IEC; GAN can create realistic images of wide-variety of object designs, while IEC can consider the users preference in the design. The combination is performed by optimizing the latent variables in GAN by IEC. A vector of random latent variables is utilized in GAN to generate various images. The generated image depends on the values of the latent variables, thus preferable design image can be obtained by adjusting the values of them. IEC can effectively adjust the values by regarding them as genes in chromosomes, based on the user's selection.

Recently, some methods were proposed to design objects and artistic images using the combination of GAN and IEC [1]-[5]. In this talk, three of them, which were proposed by the speaker, are introduced. The first one adopts conditional GAN with the input contour images of objects such as shoes [3], the second adopts DCGAN to design tile shapes which reflect the adjectives the user wants to express [4], and the last adopts StyleGAN to design movie posters with letters which consider fine to coarse structure of the contents [5]. Compared with the other works [1][2], our methods have characteristics that some constraints are imposed on the system in order to get satisfactory design result efficiently. Computer simulations show that the proposed systems can generate realistic fine designs, and also the results of subjective assessment verify that the obtained designs are satisfactory enough.

Biography

Kaoru Arakawa received the B.E., M.E. and PhD degrees in Electronic and Electric Engineering from the Univ. of Tokyo in 1980, 1982, and 1986, respectively. During 1984-1985, she studied at Caltech, USA, as a Fulbright Student. In 1989, she joined the Department of Computer Science, Meiji University, as a Full-time Lecturer, and became an Associate Professor, and a Professor in 1992 and 1998, respectively. In 2013, she moved to School of Interdisciplinary Mathematical Sciences, Meiji University, where she is now a Dean and a Professor. In 1995, she was a visiting researcher at the University of California at Santa Barbara. She is a Fellow of IEICE and JFES. She received Best Paper Award from IEICE in 2004, IEEE Tokyo Section Women Pioneer Award in 2006, and SCAT President Grand Award in 2022. Her research interests include audio and visual signal processing, machine learning, and biomedical information analyses.

Wednesday, 20th July 2022, 17:00 – 17:30

A Latency-aware Memory Scheduling Archiecture of Neural Network Processor for Deep Learning Systems

Dr. Dong-Sun Kim
Vice President, Korea Electronics Technology Institute, Korea

Abstract

This paper presents a comprehensive improved performance of the hardware realizations of artificial neural network (ANN) models, known as hardware neural networks (HNN) with a latency-aware memory scheduler. We study the overall progress in the field across all major ANN models, hardware design approaches. And then, this paper presents a high performance neural network processor optimized for scientific computations such as image processing and artificial neural networks. The proposed processor employs an SIMD architecture consisting of 256 processing units (PUs), a non-linear functional unit (NFU), and a control unit (CU), which are connected through two global data buses, one control bus, and a fully connected matrix programmable bus architecture. The instruction program is stored in the embedded program memory; on the other hand, the data are distributed in the embedded local memories (LMs) and an external data memory. The global data bus and ring bus allow data to broadcast and PU-to-PU data to transfer. The CU generates the control signals for all PUs and allows address jump and branch functions. The NFU is a look-up table memory that realizes an arbitrary non-linear function. Global Register File (GRF) is used to store data from NFU. The data in GRF are to be broadcasted to PUs

through the data bus or the ring bus. Each PU consists of 32-bit fixed point numerical arithmetic units, a 32-bit 16-word register file, 16-bit 1.5K-word LM, special purpose registers (CR, FR, and AR), and an address modifier (AM), respectively. The functionality and the performance of the proposed processor are verified with the character recognition application on the FPGA platform board. Finally, we show that neural network processor produces significantly better results on applications accompanied by heavy memory access than software processing. Suppose the proposed processor is implemented as a chip using 0.18-micron process technology, it is expected to operate at 400MHz clock speed, and then its computing power could be over 4 times faster than a 2.8 GHz PC.

Biography

Dong-Sun Kim received B.E and M.E degrees in the School of Electronics and Electrical Engineering in 1997 and 1999, respectively, from INHA University, Incheon, Korea. In 2005, he received a Ph.D. degree from the School of Information and Telecommunication Engineering of INHA University, Incheon, Korea. Since 1999, he has been with the Korea Electronics Technology Institute (KETI), Gyeonggi-do, Korea and working on R&D at the Semiconductor and Display R&D Division, where he currently is a vice president. In 2018, 2019 and 2020, he joined the Korea Evaluation Institute of Industrial Technology(KEIT) as a semiconductor program director (PD). His research interests are in the areas of wireless/wired communication systems, wireless sensor networks, VLSI & SoC design, multimedia codec design, computer architecture, and embedded system design.

Wednesday, 20th July 2022, 17:30 – 18:00

Model-Based Bayesian Signal Processing

Prof. Nattapol Aunsri
Mae Fah Luang University, Thailand

Abstract

s.♯Bayesian signal processing has attracted the reserchers enormously since the last three decades. In order to implement this framework, mathematical models that describe the physical characteristic of the problem are required. The well known filter for this framework is the Kalman filter (KF) that works effectively for the problems under the linear and Gaussian assumptions. However, most real word problems do not follow this restriction, therefore more sophisticataed filters have been proposed. Particle filtering, a sequential Monte Carlo method, is a powerful method for estimating states from non-linear/non-Gaussian models have come into consideration. Particles, which are sets of random samples, are randomly generated to approximate the posterior probability density function (PDF) of the state parameters. Its utilization has been found to be excellent for wide range of aplications. This talk introduces the importance of model-based signal processing for engineering applications, and then discusses how KF and particle filter (PF) can be emplyed for signal

processing problems. Some examples from recent reserarches are provided to further elaborate the utilization of the framework

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Biography

Nattapol Aunsri received B.Eng. and M.Eng. degrees with Electrical Engineering in Khon Kaen University and Chulalongkorn University in 1999 and 2003, respectively. Also, he received M.Sc. and Ph.D. in Mathematical Sciences in 2008 and 2014, respectively from New Jersey Institute of Technology, USA. Currently he is an assistant Professor of Computer Engineering at the School of Information Technology, Mae Fah Luang University. He was Program Committee Member of IEEE The 21st International Symposium on Wireless Personal Multimedia Communications (WPMC-2018), IEEE The 6th Global Wireless Summit (GWS2018), IEEE ECTI-CON 2018, ISFT 2018, ECTI-DAMT NCON 2021, and ECTI-DAMT NCON 2022. His research areas and expertise are Signal processing, Bayesian filtering, underwater acoustics, biomedical signal processing, machine learning applications, and mathematical and statistical modelling.

4   Program at a Glance

Wednesday, 20th July 2022

14:00 – 15:40	Special Session 1: NLP and Chatbot Healthcare
	Room: Maple
	Chair: Kyungsook Kim (Namseoul University, Korea)
	Papers: SS 1-1, SS 1-2, SS 1-3, SS 1-4, SS 1-5
15:40 – 16:00	Break
16:00 – 17:40	Regular Session 1: Smart Contents, Systems, Applications
	Room: Maple
	Chair: Su-Kyung Yoon (Jeonbuk National University, Korea) Papers: RS 1-1, RS 1-2, RS 1-3, RS 1-4, RS 1-5
	Regular Session 2: Poster
	Room: Birch
	Chair: Jeong-Dong Kim (Sunmoon University, Korea)
	Papers: RS 2-1, RS 2-2, RS 2-3, RS 2-4, RS 2-5, RS2-6, RS2-7

Thursday, 21st July 2022

08:30 - 09:00	Pre-arrangement
09:00 – 10:40	Regular Session 3: Smart Contents, Systems, Applications
	Room: Maple Chair: Jeong-geun Kim (Kyungpook National University, Korea) Papers: RS 3-1, RS 3-2, RS 3-3, RS 3-4, RS 3-5
	Regular Session 4: Poster
	Room: Birch Chair: Youngmo Kim (Soongsil University, Korea) Papers: RS 4-1, RS 4-2, RS 4-3, RS 4-4, RS 4-5, RS 4-6, RS 4-7, RS 4-8 , RS 4-9
10:40 – 10:50	Break
10:50 – 12:30	Regular Session 5: Smart Contents, Systems, Applications
	Room: Maple

	Chair: Thongchai Yooyativong (Mae Fah Luang University, Thailand) Papers: RS 5-1, RS 5-2, RS 5-3, RS 5-4, RS 5-5
	Regular Session 6: Poster Room: Birch Chair: Jinho Ahn (Hoseo University, Korea) Papers: RS 6-1, RS 6-2, RS 6-3, RS 6-4, RS 6-5, RS 6-6, RS 6-7, RS 6-8 , RS 6-9
12:30 – 13:50	Lunch Break
13:50 – 14:00	Pre-arrangement
14:00 – 15:40	Special Session 2: Smart Contents, Systems, Applications Room: Maple Chair: Su-Yeon Kim (Daegu University, Korea) Papers: SS 2-1, SS 2-2, SS 2-3, SS 2-4, SS 2-5
	Regular Session 7: Poster Room: Birch Chair: YongHwan Lee (Wonkwang University, Korea) Papers: RS 7-1, RS 7-2, RS 7-3, RS 7-4, RS 7-5, RS 7-6, RS 7-7, RS 7-8 , RS 7-9
15:40 – 16:00	Break
16:00 – 16:30	Plenary Session (Maple, Bareve Hotel) Chair: Chayapol Kamyod (Mae Fah Luang University, Thailand) Message from General Chair: Taek-Geun HwangBo (Gachon University, Korea)
16:30 – 17:00	Keynote Speech: COMBINATION OF GAN WITH INTERACTIVE EVOLUTIONARY COMPUTATION TO DESIGN OBJECTS Invited Speaker: Prof. Kaoru Arakawa Meiji University, Japan
17:00 – 17:30	Keynote Speech: A Latency-aware Memory Scheduling Archiecture of Neural Network Processor for Deep Learning Systems Invited Speaker: Dr. Dong-Sun Kim

17:30 – 18:00	Korea Electronics Technology Institute, Korea Keynote Speech: Model-Based Bayesian Signal Processing Invited Speaker: Prof. Nattapol Aunsri Mae Fah Luang University, Thailand
16:00 – 17:00	Regular Session 8: Poster Room: Birch Chair: Inpyo Cho (KETI, Korea) Papers: RS 8-1, RS 8-2, RS 8-3, RS 8-4, RS 8-5, RS 8-6, RS 8-7, RS 8-8, RS 8-9,
17:00 – 18:00	Regular Session 9: Poster Room: Birch Chair: Chang Choi (Gachon University, Korea) Papers: RS 9-1, RS 9-2, RS 9-3, RS 9-4, RS 9-5, RS 9-6, RS 9-7, RS 9-8, RS 9-9

Friday, 22nd July 2022

09:30 – 10:45	Special Session 3: High Performance DSaaS Online Chair: Haechul Choi (Hanbat National University, Korea) Papers: SS 3-1, SS 3-2, SS 3-3, SS 3-4, SS 3-5
10:45 – 11:00	Break
11:00 – 13:00	Regular Session 10: Smart Contents, Systems, Applications Online Chair: Chayapol Kamyod (Mae Fah Luang University, Thailand) Papers: RS 10-1, RS 10-2, RS 10-3, RS 10-4, RS 10-5, RS 10-6
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5   Technical Program

RS1   Regular Session: Smart Contents, Systems, Applications (Maple)

Wednesday, 20th July 2022, 16:00 – 17:40

Chair: Su-Kyung Yoon (Jeonbuk National University, Korea)

RS1-1	**An adaptive algorithm to improve sound rendering performance**	*636*

SukWon Choi, Eunjae Kim(Sejong University), Cheong Ghil Kim(Namseoul University), Woo-Chan Park(Sejong University)

RS1-2	**A MULTI-THREAD ALGORITHM TO IMPROVE THE PERFORMANCE OF SOUND RENDERING FOR MOBILE DEVICES**	*661*

Eunjae Kim, SukWon Choi(Sejong University), Cheong Ghil Kim(Namseoul University), Woo-Chan Park(Sejong University)

RS1-3	**WORKLOAD PREDICTION AND RESOURCE MANAGEMENT FOR CLOUD COMPUTING**	*658*

Su-Kyung Yoon (Jeonbuk National University)

RS1-4	**WORKLOAD ADAPTIVE HYBIRD MEMORY SYSTEMS**	*659*

Su-Kyung Yoon (Jeonbuk National University)

RS1-5	**DEEP-LEARNING BASED TRAFFIC ANALYSIS SYSTEM FOR REAL-TIME CYBER ATTACK DETECTION**	637

Youngsun Kwon, Hoon Chang (Soongsil University)

RS2   Regular Session: Poster

Wednesday, 20th July 2022, 16:00 – 17:40

Chair: Jeong Dong Kim (Sunmoon University, Korea)

RS2-1	**PRE-TRAINED NETWORK-BASED TRANSFER LEARNING FOR TIRE PREDICTION**	*621*

Candra Zonyfar, Jeong-Dong Kim (Sunmoon University)

RS2-2	**RENTAL HOUSE PRICE PREDICTION USING MACHINE LEARNING**	*649*

Kwonwoo Lee, Sejong Jeon, Jaewon Baek, Changwan Choi, Subin Ha, Solhan Jin, Jeong-Dong Kim (Sunmoon University)

RS2-3	**DEEP LEARNING-BASED URBAN SOUND CLASSIFICATION**	*650*

Prince Delator Gidiglo, Jeong-Dong Kim (Sunmoon University)

RS2-4	**BI-LSTM MODEL FOR STRESS BEHAVIOR ANALYSIS THROUGH HUMAN ACTIVITY RECOGNITION**	*651*

Soualihou Ngnamsie Njimbouom, Jeong-Dong Kim (Sunmoon University)

RS2-5   **MACHINE LEARNING-BASED DENTAL CARIES PREDICTION**   *652*

Inae Kang, Jeong-Dong Kim (Sunmoon University)

RS2-6   **A DESIGN AND IMPLEMENTATION OF FOOD INGRIDIENT RECOGNITION AND RECIPE RECOMMENDATION SYSTEM**   *590*

Gloria Geine, Jong-Hyeon Lee, Jun-Hyeok Chae, So-Yeon Ahn, Su-Bum Lee, Jeong-Dong Kim(Sunmoon University)

RS2-7   **Proposal of 3D skeleton accuracy improvement algorithm and applied to compression experiment**   *683*

Sol Lee, Yong Ho Seo, Dong Wook Kim (Kwangwoon University)

RS2-8   **A Bit-Controlled Antirandom Test Pattern Generation for Test Time Reduction**   *675*

Sungjae Lee, Sangseok Lee, and Jin-Ho Ahn (Hoseo University)

RS3   Regular Session: Smart Contents, Systems, Applications

Thursday, 21st July 2022, 09:00 – 10:40

Chair: Jeong Geun Kim (Kyungpook National University, Korea)

RS3-1   **Implementation of Loneliness Prevention Application using Acceleration Sensor and Emotional State Change**   *655*

Yeolwoo Sung, Daeseung Park, Cheong Ghil Kim (Namseoul University)

RS3-2   **Implementation of Emotion Management System for Alleviation of Depression**   656   *578*

Yeolwoo Sung, Daeseung Park, Cheong Ghil Kim (Namseoul University)

RS3-3   **AN AI-BASED VIDEO BLOCKING SYSTEM TO PREVENT ILLEGAL HARMFUL VIDEO DISTRIBUTION IN PERSONAL MOBILE BROADCASTING SERVICE**   638   *578*

Byeongchan Park, Ruziev Ulugbek, Seok-Yoon Kim (Soongsil University)

RS3-4   **Modeling Near-Far Memory Architecture for Heterogeneous Computing Systems (Work-in-Progress)**   676

Jeong Geun Kim (Kyungpook National University)

RS3-5   **Based on Deep Learning Kiwi Pest Automatic Classification System**   *616*

SaeBom Lee, Chang Choi (Gachon University)

RS3-6   **A CASE STUDY: BIOMETRIC AUTHENTICATION THROUGH ECG SIGNALS**   618

Hacı İsmail Aslan, Chang Choi (Gachon University)

RS4   Regular Session: Poster

Thursday, 21st July 2022, 09:00 – 10:40

Chair: Youngmo Kim (Soongsil University, Korea)

RS4-1   **Luong Attention Model for Gesture Recognition using Skeleton Data**   *619*

Chanuk Kyeong, Young Ghyu Sun, Joonho Seon, Soo Hyun Kim, Seongwoo Lee (Kwangwoon University, SangWoon Lee, Cheong Ghil Kim (Namseoul University), Jin Young Kim (Kwangwoon University)

RS4-2   **Implementation of Assesement Application for Pressure Ulcer Stages**   *622*

Jaeseung Kim, Soonchul Kwon, Shenghyun Lee (Kwangwoon University), Changsik Pak, Hyunsuk Suh, Joonpio Hong (University of Ulsan College of Medicine)

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Jaekwang Oh, Soonchul Kwon, Shenghyun Lee (Kwangwoon University)

RS4-4   **A Study on Disaster warning display system using ATSC3.0**   668

Sangwoon Lee, Cheong Ghil Kim (Namseoul University)

RS4-5   **A Study on RDS 2 introduction and service plan**   669

Sangwoon Lee, Cheong Ghil Kim (Namseoul University)

RS4-6   **Digital hologram generation using chroma key composition**   679

Kichang Choi (Kwangwoon University), Hosik Kim (Educational Broadcasting System), Soonchul Kwon, Seunghyun Lee (Kwangwoon University)

RS4-7   **Diorama representation for understanding the recording and display process of transmission holograms**   680

Eonyeop Shin, Soonchul Kwon, Seunghyun Lee (Kwangwoon University)

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Hui-Ying Wu, Chang-Won Shin, Shariar Md. Imtiaz, Md. Biddut Hossain, Rupali Shindae, Erkhembaatar Dashdavaa, Tuvshinjargal Amgalam (Chungbuk National University), Sang-Keun Gil (Suwon University), Seok-Hee Jeon (Incheon University), Nam Kim (Chungbuk National University)

RS5   Regular Session: Smart Contents, Systems, Applications

Thursday, 21st July 2022, 10:50 – 12:30

Chair: Thongchai Yooyativong (Mae Fah Luang University, Thailand)

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RS5-2	**An analysis on threat scenario of market model for secure digital hologram printing content transaction** WonBin Kim (Lsware Inc.)	*617*
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RS6   Regular Session: Poster

Thursday, 21st July 2022, 10:50 – 12:30

Chair: Jinho Ahn (Hoseo University, Korea)

RS6-1	**EFFICIENT DEPTH ESTIMATION OF MONOCULAR IMAGES USING RESNET50, VIT, AND MONODEPTH2** Woosung Shin, Woori Han, Youngseop Kim (Dankook University)	*607*
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RS6-4	**BIRDCLEF 2022: SELF-SUPERVISED AUDIO SPECTROGRAM TRANSFORMER**	674

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Junseok Oh, Eunsoo Cho and Ji-Hwan Kim (Sogang University)

RS6-6	**Implementation of AI Tracking Agency using Unity ML-Agents ToolKit**	*662*

Seok Ho Han, Yong-Hawn Lee (Wonkwang University)

RS6-7	**Simulation for Optimal Installation Location of Campus CCTV using Unity Cinemachine**	*663*

Tae Wook Kim, Hye Rim Jo, Seok Ho Han, Yong-Hwan Lee (Wonkwang University)

RS6-8	**Implementation of Efficient Sound Management with Unity AudioMixer**	*664*

Hyejin Park, Kangin Lee, SeokHo Han, Yong-Hawn Lee (Wonkwang University)

RS6-9	**Implementation of Single Image Reflection Removal**	*665*

Hye Rim Jo, Yong-Hawn Lee (Wonkwang University)

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Sabina Umirzakova, Shabir Ahmad, Taegkeun Whangbo (Gachon University)

RS7-4	**Implementation of virtual reality serious game contents for non-surgical training of strabismus patients and clinical trials for strabismus patient**	*646*

JeHyun Kim, GiSung Oh, WonJun Jung, Whangbo TeagKeun (Gachon University)

RS7-5	**A PARSIMONIOUS APPROACH TO METAVERSE UX/UI DESIGN FOR THE SENIOR POPULATION**	*647*

Wonjun Jeong, Gisung Oh, Jehyun Kim, Taegkeun Whangbo (Gachon University)

RS7-6	**Verification of the rehabilitation effectiveness of VR contents for MCI patients using MMSE-KC**	*657*

Gisung Oh, Wonjun Jung, Jehyun Kim, Teagkeun Whangbo (Gachon University)

RS8   Regular Session: Poster

Thursday, 21st July 2022, 16:00 – 17:00

Chair: Inpyo Cho (KETI, Korea)

| RS8-6 | **A Study on Exploratory Data Analysis and Anomaly Detection for Fault Diagnosis of Smart Buoy** | *628* |

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| RS8-7 | **Lightweight Ultrasonic Signal based Flow Measurement System using Efficient Time-of-flight Estimation** | *629* |

Seongseop Kim, Seungwoo Lee and Youngmin Kwon (Korea Electronics Technology Institute)

| RS8-8 | **Study of the MachineAtttention Based Image Compression for Video Coding for Machine** | *681* |

Kyungro Yoon(Konkuk University)

| RS8-9 | **3D Human Keypoint Ground Truth Cosntruction using Multiple Azure Kinects** | *682* |

Kyungro Yoon(Konkuk University)

RS9   Regular Session: Poster

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Chair: Chang Choi (Gachon University, Korea)

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Jongseok Yoon, Seongseop Kim and Youngmin Kwon (Korea Electronics Technology Institute)

| RS9-2 | **Analysis of EDLC-based Primary Battery Current Consumption Characteristics Considering Operation Patterns in IoT Devices** | 631 |

Minji Kang, Seongseop Kim and Seungwoo Lee (Korea Electronics Technology Institute)

| RS9-3 | **LPWAN based Battery Data Analysis Structure for Primary Battery SOC Estimation of IoT Devices** | *632* |

Jinki Ha, Seongseop Kim, and Seungwoo Lee (Korea Electronics Technology Institute)

| RS9-4 | **A STUDY OF CALIBRIRATION METHOD FOR ULTRASONIC GAS FLOW METERS** | *634* |

Youngmin Kwon, Seongseop Kim, Seungwoo Lee (Korea Electronics Technology Institute)

| RS9-5 | **LIGHTWEIGHT AND SECURE COMMUNICATION PROTOCOL FOR LPWAN BASED IOT DEVICES** | *635* |

Seungwoo Lee , Youngmin Kwon (Korea Electronics Technology Institute)

RS9-6	**Continual Learning Pipeline for Solar Power Generation Forecasting Model**	*643*

Jeongtaek Lim, Minho Kim, Kyung Sun Ham and Taehyoung Kim (Korea Electronics Technology Institute)

RS9-7	**MUSIC ROYALTIES DISTRIBUTION STRUCTURE ANALYSIS IN KOREA**	*645*

Youngmin Kim (Korea Electronics Technology Institute), Dong Hwan Kim (CATBELL COMPANY), Sunho Park (CHOROCK SOFT), Byoungsoo Koh, Hyun Jung(KOREA Creative Content Agency), YongHwa Kim, Jisoo Hong, Sunghee Hong, Jinsoo Jeong, Byounghyo Lee, and Hyeonchan Oh (Korea Electronics Technology Institute)

RS10   Regular Session: Smart Contents, Systems, Applications

Friday, 22nd July 2022, 11:00 – 13:00

Chair: Chayapol Kamyod (Mae Fah Luang University, Thailand)

RS10-1   **EVALUATION OF DVB-T2 TRANSMISSION SIGNAL MODEL FOR OUTDOOR RECEPTION IN THAILAND**

Somsanouk Pathoumvanh (National University of Laos), Sathaporn Promwong, Thanadol Tiengthong (King Mongkut's Institute of Technology Ladkrabang) and Chayapol Kamyod (Mae Fah Luang University)

RS5-2   **DVB-T2 PATH LOSS MODEL FOR DTTB IN URBAN AREA**

Myo Myint Maw (Mandalay Technology University), Sathaporn Promwong (King Mongkut's Institute of Technology Ladkrabang) and Chayapol Kamyod (Mae Fah Luang University)

SS1   Special Session: NLP and Chatbot Healthcare

Wednesday, 20th July 2022, 14:00 – 15:40

Chair: Kyungsook Kim (Namseoul University, Korea)

SS1-1	**A STUDY ON NON-FACE-TO-FACE WORK EXPERIENCE OF CASE MANAGEMENT SOCIAL WORKERS IN COVID-19 SITUATION: FOCUSING ON ETHICAL DILEMMA**	*614*

So Yun Choi (Namseoul University)

SS1-2	**COEEELATION BETWEEN SNS ADDICTION TENDENCY OF UNIVERSITY STUDENTS, DEPRESSION, AND INTERPERSONAL PROBLEMS**	*625*

Kyung Sook Kim (Namseoul University)

SS1-3	**Digital sexual crimes perceptions of university students**	*633*

Kyung Sook Kim (Namseoul University)

SS1-4	**Implementation of Multi-Turn Chatbot with Weather Information Based on Dialogflow**	*654*

, Yeolwoo Sung, Daeseung Park, Cheong-Ghil Kim (Namseoul University)

SS1-5   **A STUDY OF CHATBOT ARCHITECTURE USING AI-BASED INTERVENTION IN MULTI-PURPOSE CHATBOT SERVICE**

Daeseung Park, Yeolwoo Sung, Changhyun Jang, Moon Kyung Bang, Cheong Ghil Kim (Namseoul University)

SS2   Special Session: Smart Contents, Systems, Applications

Thursday, 21st July 2022, 14:00 – 15:40

Chair: Su-Yeon Kim (Daegu University, Korea)

SS2-1   **Intelligent Aquaponics System for Home Using Medaka**   *608*

SuYeon Kim (Daegu University, Korea)

SS2-2   **System design to identify the congestion level of tourist attractions and recommend shooting spots using SNS data**   *609*

SuYeon Kim (Daegu University, Korea)

SS2-3   **Design of rail system for multiple output of personal 3D printer**   *610*

SuYeon Kim (Daegu University, Korea)

SS2-4   **A system for providing a customized lighting environment to users using smart healthcare devices**   *611*

SuYeon Kim (Daegu University, Korea)

SS2-5   **DESİGN OF AUTOMATIC ACCESS CONTROL SYSTEM FOR QUARANTİNE**   *601*
Tae-Ho Nam, Kyung-Ae Cha and Won-Kee Hong (Daegu University)

SS3   Special Session: High Performance DSaaS

Friday, 22nd July 2022, 09:30 – 11:10

Chair: Haechul Choi (Hanbat University, Korea)

SS3-1   **A JUDGMENT METHOD OF COPYRIGHT INFRINGEMENT BASED ON CLOUD STORAGE**   *671*

Seyoung Jang, Byeongchan Park, Seok-Yoon Kim and Youngmo Kim (Soongsil University)

SS3-2   **A STUDY ON APPLICATION OF OTHER MUSIC SERVICE BASED ON TBS MUSIC NETWORK PLATFORM**   *672*

Byeongchan Park, Seyoung Jang, Seok-Yoon Kim and Youngmo Kim (Soongsil University)

SS3-3   A STUDY ON THE PLATFORM FOR TRUST-GUARNATEED METAVERS MEIDA SERVICE   *677*

Seyoung Jang, Byeongchan Park, Seok-Yoon Kim and Youngmo Kim (Soongsil University)

SS3-4   METADATA STRUCTURE OF USAGE HISTORY FOR TRANSPARENT SETTLEMENT AND DISTRIBUTION OF MUSIC   *678*

Mamadalieva Nigorakhon, Ulugbek Ruziev (Namangan State University)

6   Abstracts

RS1   Regular Session: Smart Contents, Systems, Applications

Wednesday, 20th July 2022, 16:00 – 17:40

Chair: Su-Kyung Yoon (Gachon University, Korea)

RS1-1   An adaptive algorithm to improve sound rendering performance   *636*

Sukwon Choi	Sejong University
Eunjae Kim	Sejong University
Cheong Ghil Kim	Namseoul University
Woo Chan Park	Sejong University

In this paper, we propose an FPS-based adaptive algorithm that can improve the performance of sound rendering while maintaining audio quality. This adjusts the probe ray count and the maximum number of depth based on the FPS which may change accoring to the location of the listener. We performed performance verification by comparing FPS and sound intensity of the proposed algorithm and conventional algorithm. Experimental results show that the proposed algorithm improves the performance by up to 3.17 times and sound intensity by up to 2.9% compared to the conventional algorithm. The result showed that the proposed algorithm maintains higher FPS than the conventional algorithm while maintaining audio quality.

RS1-2   A MULTI-THREAD ALGORITHM TO IMPROVE THE PERFORMANCE OF SOUND RENDERING FOR MOBILE DEVICES   *661*

Eunjae Kim	Sejong University
Sukwon Choi	Sejong University
Cheong Ghil Kim	Namseoul University
Woo Chan Park	Sejong University

This paper proposes a multi-thread algorithm to accelerate the performance of sound rendering for mobile devices. Sound rendering is generally difficult to perform in real-time due to its high computing complexity. In particular, this

problem is further increased in an environment such as a mobile device with low computing power. To overcome this problem, the proposed algorithm improves the performance by using two threads. One calculates a direct, a reflection, a diffraction path, and the other calculates a reverberation. We measured the FPS of the proposed algorithm and single-threaded algorithm for performance verification. The experiment result showed that the FPS of the proposed algorithm is about 20% higher than that of the single-threaded algorithm.

**RS1-3   WORKLOAD PREDICTION AND RESOURCE MANAGEMENT FOR   *658*
            CLOUD COMPUTING**

Su-Kyung Yoon   Jeonbuk National University

Recently, with the rapid development of ICT technology, the amount of data generated has also increased rapidly. In order to effectively utilize these data, a data center is built and managed. And the data center is provided as a cloud service to users through virtualization of physical resources. Virtualization technology facilitates the management of server resources and helps optimize energy consumption. Also, one of the important factors in cloud service is the guarantee of QoS. This is because users expect services that are always available. Nevertheless, it is not easy to guarantee QoS in the current cloud data center due to the characteristics of the environment and the characteristics of the application workload. As the amount of data to be processed increases and the number of services that need to be provided in the cloud increases, network usage, CPU usage, memory and disk usage increase, and the quality of the service drops sharply. In other words, the increase in demand for cloud services due to the development of technologies such as artificial intelligence/big data analysis is a major factor that deteriorates the quality and performance of cloud services. In this paper, we propose a workload prediction and resource management technique to guarantee QoS.

RS1-4   WORKLOAD ADAPTIVE HYBIRD MEMORY SYSTEMS   *659*

Su-Kyung Yoon   Jeonbuk National University

The movement of data from a computer system's cache - main memory - to disk has been a significant overhead in computer systems. In order to reduce this overhead, the size of the cache is adjusted to fit the work set of the traditional application, and through this, the current system minimizes data movement between the cache - main memory - disk. However, as the use of applications such as artificial intelligence, big data processing, and cloud computing has increased recently, the workload group exceeding the cache size tailored to the existing workstation has increased. it started. In addition, due to frequent cache misses, access to main memory and disk increases, which is a major factor in performance degradation in current computer systems such as artificial intelligence and big data processing. The fundamental solution to solve the performance degradation for this workload group is to provide a large-capacity main memory and cache, but the current DRAM has limitations in large-capacity and high-density integration due to process limitations. Therefore, a large-capacity main memory is designed by using next-generation non-volatile memory devices with high-capacity and high-density characteristics together with DRAM. We want to design a technique that can automatically place the data in a suitable memory device.

**RS1-5   DEEP-LEARNING BASED TRAFFIC ANALYSIS SYSTEM FOR REAL-   *637*
            TIME CYBER ATTACK DETECTION**

Youngsun Kwon   Soongsil University

Hoon Chang   Soongsil University

As networks of enterprises and organizations grow larger, the need for technology to rapidly detect anomalies of cyber threats that are getting sophisticated from a large amount of traffic is increasing. The existing traffic analysis system allows intrusion against unknown attacks, and the operator has to manually set the threshold of anomaly packets according to time and circumstances, and in some cases, even normal protocol requests are blocked as false positives. In this paper, we propose a deep learning-based network traffic data analysis system to detect abnormal attacks by analyzing the shape

and type of large-capacity traffic. By automatically determining the criteria for judging abnormal traffic, operator judgment and intervention are minimized and anomaly detection in real time is possible.

RS2   Regular Session: Poster

Wednesday, 20th July 2022, 16:00 – 17:40

Chair: Jeong Dong Kim (Sunmoon University, Korea)

RS2-1   PRE-TRAINED NETWORK-BASED TRANSFER LEARNING FOR TIRE PREDICTION   *621*

Candra Zonyfar	Sunmoon University
Jeong-Dong Kim	Sunmoon University

A critical safety check of vehicle users before using them is to validate that the tires are in safe and good condition. Such as avoiding the condition of the tires being scratched, damaged due to the age of the tires, cracks, and tires having low pressure or flat tires. Tires on vehicles in poor condition can have fatal consequences such as loss of property and even dangerous accidents. This study investigated six deep learning architectures, ResNet50, ResNet101, ResNet152, DenseNet121, DenseNet169, and DenseNet201, to accurately categorize tire images as full tire class, flat tire class, or non-tire class and also on cracked or normal tires. This study experimented with two public datasets where the first dataset consisted of 900 images of full tires, flat tires, and not tires, and the second dataset was 1028 images for cracked tires and normal tires. DenseNet121 has the greatest accuracy performance with 95 percent, although ResNet152 gets high accuracy with 97 percent for other datasets.

RS2-2   RENTAL HOUSE PRICE PREDICTION USING MACHINE LEARNING   *649*

Kwonwoo Lee	Sunmoon University
Sejong Jeon	Sunmoon University
Jaewon Baek	Sunmoon University
Changwan Choi	Sunmoon University
Subin Ha	Sunmoon University
Solhan Jin	Sunmoon University
Jeong-Dong Kim	Sunmoon University

Rental House brings a new business to the hospitality industry. Pricing a property and evaluating the proposal price for a property are challenges that rental house owners and customers face daily, respectively. This paper proposes a model for predicting rental house prices using specifications for rental house accommodation. Owners and customers can use price prediction models to estimate the cost of a rental house. Machine learning techniques such as linear regression, tree-based model, Support Vector Regression, and Multi-Layer Perceptron are trained and tuned on rental house datasets in Seoul. Prediction models are evaluated on Mean Squared Error, Mean Absolute Error, and Root Mean Squared Error. Feature Importance and correlation analysis are also used to select the most representative features to predict the price of a rental house. The experimental results were highest by the test set in the RandomForest Regressor model. The price prediction model is evaluated with the Mean Absolute Error of 13.57, Mean Squared Error of 557.61, and Root Mean Squared Error of 23.61.

RS2-3   DEEP LEARNING-BASED URBAN SOUND CLASSIFICATION   *650*

Prince Delator Gidiglo	Sunmoon University

Jeong-Dong Kim   Sunmoon University

Sound classification is an extensively growing field where several deep learning algorithms are used. In this work, an approach to classify urban sound with deep learning is proposed. Experiments were carried out on the UrbanSound8K dataset, a widely used dataset in urban sound classification and sound classified using a standard deep neural network model and a convolutional neural network model. Two features, being the mel-frequency spectral coefficients (mfcc) and mel spectrogram were extracted from the dataset and used for preprocessing. The resulting image forms were used in building the models and trained.The proposed work classifies sound on the Urban Sound8K dataset using a standard deep neural network(SDNN) model and a convolutional neural network model(CNN). The evaluation metrics used were the f1 score, precision, recall and accuracy on the test dataset. The convolutional neural network model showed an overall beter performance than the standard deep neural network achieving a higher accuracy in predicting urban sound.

RS2-4   BI-LSTM MODEL FOR STRESS BEHAVIOR ANALYSIS THROUGH HUMAN ACTIVITY RECOGNITION   *651*

Soualihou Ngnamsie Njimbouom   Sunmoon University

Jeong-Dong Kim   Sunmoon University

Human activity recognition (HAR) involves identifying a person's specific action or movement using sensor data. (HAR) is a broad field of study applied to wellness care, including lifelog monitoring used to detect critical health factors in patients. Stress behavior is a typical example of critical health that can be detected by analyzing biosignals and physical activities. This paper proposes a deep learning-based HAR model to analyze the stress state of people during physical activity. The proposed model used two types of data, biosignals and acceleration data. An appropriate feature generation method that produces both time-domain and frequency-domain features was used to address the diversity of the two datasets during the experiments. An early fusion was performed to concatenate the two modalities to further perform human activity recognition. The proposed model generated an average F1-score of 0.9993, which was 0.243 and 0.005 times higher than when the recurrent neural network (RNN) and Gated Recurrent Unit (GRU) were used.

RS2-5   MACHINE LEARNING-BASED DENTAL CARIES PREDICTION   *652*

Inae Kang,   Sunmoon University

Jeong-Dong Kim   Sunmoon University

Medical big data and machine learning technologies discover new patterns of disease through data analysis. In this study, prediction of dental caries was implemented through medical oral big data and machine learning technology. Oral health is a disease that requires proper management in daily life as it is directly related to the quality of life of an individual as society develops. Once a tooth is damaged, it is difficult to return to its original healthy state. Therefore, dental caries management has a very important role in terms of oral health policy. Through a systematic review of recent cross-sectional studies, various risk factors for dental caries were discovered. The existing oral examination questionnaire selected dental caries through 43 items. In this study, the most influential features inducing dental caries were selected through the feature selection technique. In these two cases, the number and accuracy of each feature were studied by applying the machine learning methods, Random Forest and Logistic Regression. In this study, the F-1 Score of LR (Logistic Regression) was 0.18, Precision 0.52, Recall 0.11, and Accuracy 0.59, and in the RF (Random Forest) method, Score 0.94, Precision 0.99, Recall 0.88, Accuracy 0.95 were obtained.

RS2-6   A DESIGN AND IMPLEMENTATION OF FOOD INGRIDIENT RECOGNITION AND RECIPE RECOMMENDATION SYSTEM   *653*

Gloria Geine   Sunmoon University

Jong-Hyeon Lee   Sunmoon University

Jun-Hyeok Chae   Sunmoon University

So-Yeon Ahn	Sunmoon University
Su-Bum Lee	Sunmoon University
Jeong-Dong Kim	Sunmoon University

In this paper, the food items stated on the receipt can be recognized using OCR, and by determining importance and comparing it using TF-IDF and Cosine-Similarity, we can develop and apply a personalized recipe recommendation system. As a result, it is possible to provide a service that generates a customized recipe utilizing the food items that are already in possession.

RS2-7   Proposal of 3D skeleton accuracy improvement algorithm and applied to compression experiment

683

Sol Lee	Kwangwoon University
Yong Ho Seo	Kwangwoon University
Dong Wook Kim	Kwangwoon University

In this paper, we propose a method to increase the accuracy of 3D pose estimation using openpose[1]. First, after orthographic projection of 3D human data in various directions, 2D pose estimation is performed for each projected image. Therefore, the 3D skeleton is generated using epipolar geometry with only the positions of some 2D joints in the upper rank by sorting them in descending order of Confidence values. The accuracy can be measured by comparing this with the 3D skeleton extracted through the motion capture sensor. Using this method, a 3D skeleton with higher accuracy could be extracted. In addition, upon 3D human data sequence compression by generating the next frame through non-rigid deformation using 3D skeleton, and storing the residual with the actual next frame, a higher compression ratio was achieved.

RS2-8   A Bit-Controlled Antirandom Test Pattern Generation for Test Time Reduction

675

Sungjae Lee	Hoseo University
Sangseok Lee	Hoseo University
Jin-Ho Ahn	Hoseo University

A Linear Feedback Shift Register(LFSR) can create pseudo-random patterns with only a simple structure, so it is suitable for an on-chip structure with many limitations in logic size, but has many disadvantages as an external structure for at-speed testing. In particular, in the case of pseudo-random patterns, a fault coverage of 70-80% can be achieved within a short time, but a fairly large number of patterns is required to obtain a fault coverage of more than 90% to satisfy the ISO 26262 ASIL B standard. In order to reduce the test time in the black box test environment, an improved random pattern generation method is required compared to the pseudo-random type generated with the same probability. In this paper, we propose a method to upgrde failure detection efficiency per single pattern based on distance function between test patterns and using bit-controlled pattern generation.

RS3   Regular Session: Smart Contents, Systems, Applications

Thursday, 21st July 2022, 09:00 – 10:40

Chair: Jeong Geun Kim (Kyungpook National University, Korea)

RS3-1   **Implementation of Loneliness Prevention Application using Acceleration Sensor and Emotional State Change**   *655*

Yeolwoo Sung	Namseoul University
Daeseung Park	Namseoul University
Cheong Ghil Kim	Namseoul University

This study was intended to develop an application to prevent loneliness. It identifies whether the user is leading an active life, and in case of an emergency, a simple gesture can be used to contact 119 or a guardian. , eating habits, and application usage time were used to identify changes in the users emotional state, and to share the users state with guardians

RS3-2   **Implementation of Emotion Management System for Alleviation of Depression**   *656*

Yeolwoo Sung	Namseoul University
Daeseung Park	Namseoul University
Cheong Ghil Kim	Namseoul University

In this system, when a user logs in through membership registration, the functions of depression self-diagnosis, planner, real-time activity record, emotion diary, and chatbot can be used. Through the CES-D Depression Test, you can know your level of depression, and through periodic tests, you can check your cumulative graph. To improve your results, you can use features such as setting goals for sleep time and steps and keeping a simple diary. In addition, the chatbot intends to provide the necessary solution to the user based on the user's cumulative graph. Therefore, this project aims to develop an application to help users alleviate depression through not only diagnosing depression, but also managing physical activity and delivering information.

RS3-3   **AN AI-BASED VIDEO BLOCKING SYSTEM TO PREVENT ILLEGAL HARMFUL VIDEO DISTRIBUTION IN PERSONAL MOBILE BROADCASTING SERVICE**   *638*

Byeongchan Park	Soongsil University
Ruziev Ulugbek	Soongsil University
Seok-Yoon Kim	Soongsil University

As the MCN environment has become popular recently, the use of mobile personal broadcasting services(web, app) is rapidly increasing. As a result, however, the damage to illegally harmful videos in internet personal broadcasting, which lacks regulation and results in sponsored money, is being seriously highlighted. One-person media provider platform operators are regulated by the relevant laws, but there is a limit to respond immediately. In this paper, we propose an artificial intelligence-based illegal harmful video blocking system to prevent the distribution of illegal harmful videos in online personal broadcasting services. The proposed system can be used as an automation tool for active sanctions against illegal and harmful videos of single media provider platform operators.

RS3-4   **Modeling Near-Far Memory Architecture for Heterogeneous Computing Systems (Work-in-Progress)**   *676*

Jeong Geun Kim	Kyungpook National University

Since memory-intensive workloads such as deep-learning based applications, in-memory processing, and big-graph processing programs have been widespreaded recently, the memory wall problem has been considered more seriously than previous days. Therefore, near-far memory systems have been spotlighted as one of the future heterogeneous computer's memory model because of its scalability and satisfying the sweetspot for modern workloads that requires a large working memory size with low memory response time [1, 2]. Hence, computer architects have tried to adopt near-far memory architecture for computing systems with two different types of memory devices for realizing its design goal

[1, 2, 3, 4]. However, the essential component for near-far memory architecture is storage-class memories (SCMs) that is based on different technology compared to previous memory devices such as DRAM and NAND-flash memory. Moreover, the most of SCM devices are not available for end-users and consumers, and it does not expose its interal management method or flexible interfaces for hardware researchers. Hence, many computer architects try to evalute their proposed memory or cache models with computer simulators, such as Ramulator [5], ChampSim [6] and gem5 [7] without modifying any hardware components and RTL-level design. In this work, we introduce our work-in-progress version of near-far memory architecture simluator that is focused on modeling two different kinds of near-far memory architectures; consisting of (1) traditional cache-hierarchy like near-far memory model and (2) local(near) and remote(far) memory architecture for n-heterogeneous-processors (configured as multiple heterogeneous processors including CPU, GPGPU, NPU, etc.). The current status of near-far memory modeling simulator is focused on increasing its simulation accuracy with adopting multi-channel / multi-bank structure for global memory system layer, and our furthre study will expand this simulator as providing two distinct models of near-far memory systems with supporting various interconnection standards such as Gen-Z or CXL (Compute Express Link) [9] protocols.

RS3-5   Based on Deep Learning Kiwi Pest Automatic Classification System

616

| SaeBom Lee | Gachon University |
| Chang Choi | Gachon University |

Agriculture accounts for a large portion of the global economy, of which fruit is grown and traded worldwide. Among fruit crops, the most consumed and traded crop is kiwi, producing 4,274,870 tons per year worldwide. However, there is a problem that kiwis are sensitive to climate change and are very vulnerable to plant diseases and insects. In particular, the problem of plant pests deteriorates the quality of kiwi and causes a decrease in yield. In recent years, with the development of computer systems, various deep learningbased plant pestrelated studies have been conducted. These studies are contributing to preventing the spread of pests and reducing crop damage by detecting diseases of plants vulnerable to pests early. However, there are still many difficulties due to the problem of insufficient data sets. In this paper, a data set was constructed by collecting 17,998 images from actual plantations. The constructed data set was trained, verified, and tested using the pretrained ResNet50 model and DenseNet161 model. The ResNet50 model derived an accuracy of 97% and an F1 score of 98%, and the DenseNet161 model derived an accuracy of 98% and an F1 score. Since both models have high result values, it is expected that the use of the model proposed in this study will effectively classify kiwi diseases and prevent the spread of pests.

RS3-6   A CASE STUDY: BIOMETRIC AUTHENTICATION THROUGH ECG SIGNALS

618

| Hacı İsmail Aslan | Gachon University |
| Chang Choi | Gachon University |

As the intrusion tendencies increased, many authentication protocols came into prominence. Naturally, keywise data such as passwords, fingerprints, photos, eyescans, etc., are subject to be used by institutes around the globe. One of these keywise data is electrocardiogram since it has some characteristic attributions depending on individuals. To enhance the security metrics without yet another approach, we were particularly interested in investigating the impact of building an authentication method on private ECG data obtained by a research group. To segment ECG signals, we applied a sliding windowbased approach, which makes the feature extraction step different. According to the results, we observed the true match rate, and true nonmatch rate as %95.41 and %94.33, respectively. Since results depend on the selected threshold value, it is possible to get %100 accuracies by trading off the drastically increasing false nonmatch rate, as discussed in the results section.

RS4   Regular Session: Poster

Wednesday, 29th December 2021, 11:15 – 12:45

Chair: Youngmo Kim (Hoseo University, Korea)

RS4-1   Luong Attention Model for Gesture Recognition using Skeleton Data   *618*

Chanuk Kyeong	Kwangwoon University
Young Ghyu SunLee	Kwangwoon University
Joonho Seon	Kwangwoon University
Soo Hyun Kim	Kwangwoon University
Seongwoo Lee	Kwangwoon University
SangWoon Lee	Namseoul University
Cheong Ghil Kim	Namseoul University
Jin Young Kim	Kwangwoon University

In this paper, attention network is used to build spatial and temporal model for gesture recognition. The model based on long short-term memory (LSTM), which can learn to selectively focus on joints, angle features of skeleton data and each frame, is proposed to improve the performance of the gesture recognition model. Blazepose is employed to extract joints and angle features from fitness gesture images supplied by AI hub. Dataset is composed of 8 kinds of body fitness gestures.

RS4-2   Implementation of Assesement Application for Pressure Ulcer Stages   *622*

Jaeseung Kim	Kwangwoon University
Soonchul Kwon	Kwangwoon University
Shenghyun Lee	Kwangwoon University
Changsik Pak	University of Ulsan College of Medicine
Hyunsuk Suh	University of Ulsan College of Medicine
Joonpio Hong	University of Ulsan College of Medicine

Recently, artificial intelligence has been used in various fields. In the field of computer vision, artificial intelligence is used in research such as object detection, object tracking, semantic segmentation, posture estimation, etc., and is particularly applied to wound diagnosis. Image-based wound diagnosis can be applied to initial treatment and remote diagnosis. In this study, we proposed a method for diagnosing pressure ulcer stages through YOLOv5 and implemented it as a web application. YOLOv5 is a model with excellent real-time performance and accuracy in the field of object detection. We collected a dataset consisting of 6,611 AI images. Each image was labeled with a bounding box for pressure ulcers 1 to 4. The AI dataset consists of 80% training data, 10% validation data, and 10% test data. The accuracy of the learning results was increased by data augmentation through GAN. As training parameters, epoch 200, batch size 64, and stochastic gradient descent (SGD) optimizer were used. The learning rate was decreased sequentially using a scheduler. The feature pyramid network method was used to detect large, medium, and small pressure ulcers in images with high accuracy. We implemented an AI model that generates bounding boxes from three feature maps of different sizes. As hardware, AMD Ryzen 7 5800X and RTX3090 were used. The software used python3.8.0 language on Windows 10, and OpenCV and PyTorch were used as the main library. The size of the input image is 224 by 224 pixels. The proposed model was implemented as a web application. The web application has easy accessibility that can be used on any platform. The artificial intelligence model is calculated in the cloud server. This also has an advantage in AI processing time. Through this study, the possibility of expanding the application of AI-based wound assessment was demonstrated.

RS4-3   A study of real-time holoportation system for remote avatar animation   *624*

Jaekwang Oh   Kwangwoon University

Soonchul Kwon   Kwangwoon University

Shenghyun Lee   Kwangwoon University

Recently, the development of non-face-to-face technology is accelerating due to COVID-9. In particular, the application of AR/VR services that can be utilized in indoor spaces is being applied to various industries. In this study, we propose the development of an AR-based online service platform that animates 3D avatars using a depth camera.

First, the depth information of the user is extracted through the depth camera, Azure Kinect. Based on the depth information, an artificial intelligence model estimates the position and rotation values of 32 joints. The joint information is matched with the joint information of the 3D Rigged avatar of the Unity platform. The SMPL/SMPLX avatar was chosen because it contains joint information essential for generating animation. The avatar can be animated by following the user's movements. It uses the room-based network service Photon Cloud to transmit/receive user joint data to all clients in the room in real-time.

Real-time operation (30 fps) was satisfied by compressing the packet size through type conversion and encoding joint information for low-latency service. We were able to keep Packet Internet Groper (Ping) between 20ms and 25ms by reducing the packet size from 1,584 bytes to 868 bytes. Up to 4 people can use the AR Holoportation service simultaneously. This study showed that it can be used for teleconference and telemedicine in the future.

RS4-4   A Study on Disaster warning display system using ATSC3.0   *668*

SangWoon Lee   Namseoul University

Cheong Ghil Kim   Namseoul University

In this paper, using the ATSC3.0 mobile broadcasting system, a newly introduced service, a disaster warning system and offer service is proposed.

ATSC3.0 has a robust transmission function differentiated from mobile communication services that can be easily disabled in disaster situations such as typhoons, earthquakes, and wildfires, and provides disaster alerts including detour routes and shelter locations for the public in various disaster situations. It is used as a delivery channel.

This proposed display system provides services such as general news and advertisements in normal times when disaster warning is not required, and thus has the potential to be used for profit business. In addition, in a situation in which communication is normally maintained, content transmission using a communication network is possible, and when broadcast reception is not possible, it includes a function of directly inputting information into the display using a keyboard, a touchpad, a USB memory, etc.

RS4-5   A Study on RDS 2 introduction and service plan   *669*

SangWoon Lee   Namseoul University

Cheong Ghil Kim   Namseoul University

RDS 2 is a new broadcasting technology for providing a data service using FM radio broadcasting system that is currently operated in all most countries in the world, including Korea.There is an advantage in that data service can be easily provided using the corresponding FM broadcasting system. In addition, the FM broadcasting system has a characteristic that is differentiated from mobile communications, so it can be used to provide a variety of services, including disaster warning services.

In this study, policy and technical considerations for introducing FM RDS 2 service and service composition methods are proposed.

RS4-6   **Digital hologram generation using chroma key composition**   *679*

Kichang Choi	Kwangwoon University
Hosik Kim	Educational Broadcasting System
Soonchul Kwon	Kwangwoon University
Seunghyun Lee	Kwangwoon University

Digital holograms can be produced by photographing real objects or by generating 3D CGs. In the case of object photographing, the camera rotates around the main subject, takes an image of the multi-view, and then outputs it as a continuous image. In the case of CG generation, it is a method of rendering an image sequence by rotating a virtual camera after constructing a scene with a 3D graphics production tool.

In this paper, we propose a method of creating a digital hologram that fuses these two image acquisition methods by applying a chroma key synthesis technique. The proposed workflow is the process of first placing a subject on a green screen to photograph it, and then synthesizing it with a chroma key technique in a later work tool to acquire an image. The advantages of using these workflows are that separating the subject from the background allows you to focus on shooting the scene without having to completely organize the scene at the time of shooting, and allows you to select various 3D graphic backgrounds and synthesize them later in the process. Among the workflows, a time-lapse photographing technique was newly applied to the photographing step. Existing object photography was a method of filming in a video format and extracting continuous images from there, but the method of photographing continuous still images of multi-view from the shooting stage was used. The advantage of applying the time-lapse photographing technique is that it is possible to implement a deeper depth compared to a video format under the same lighting conditions, thereby preventing quality degradation due to focus and performing a later work with the RAW file format. However, it takes longer to shoot compared to the video acquisition.

The photographed object was synthesized with CG using chroma key synthesis technique. Through processes such as stabilizing and match moving, digital holograms were calibrated to an optimal state that could be produced. Several obtained multi-point projection images were used to generate a holographic element (hogel) image, and this multi-view image was recorded on a holographic material using a digital holographic printer. It is expected that various digital hologram contents can be produced by applying the production technique according to the workflow presented in this paper.

RS4-7   **Diorama representation for understanding the recording and display process of transmission holograms**   *680*

Eonyeop Shin	Kwangwoon University
Soonchul Kwon	Kwangwoon University
Seunghyun Lee	Kwangwoon University

Holograms are 3D images that are diffracted after recording the interference of light and allow for an understanding of many basic physical principles (lasers, interference and diffraction of light, etc.). In addition, it is expected as an educational tool to foster creative talents in the field of ultra-realistic media with convergent thinking of engineering and art. As awareness of holograms becomes popular in the future and applications increase, it will become a new economic growth engine in the future to realize a human-centered content service society from daily life to all industries. However, looking at the production process for understanding existing analog holograms, the access system and understanding structure of information for direct experience are very difficult. In order to further increase the sense of immersion and reality in terms of the viewer experience, it is necessary to use a method that can show the viewer's gaze not only in the front but also in various directions. In addition, when a hologram is fused with an actual object, a sense of reality is added, and a 3D effect can be obtained. Diorama is to create and reinterpret a scene of a situation by installing 3D models on the background. It is a 3D display of models and backgrounds that reduce or expand reality, past, or future scenes according to a purpose. In this paper, we construct a diorama for the manufacturing process of analog holograms as a way to

recognize the importance of the transfer of knowledge and information through indirect experiences. The hologram production process consisted of five stages: content acquisition, hologram recording, hologram development processing, hologram display, and hologram copying. In addition, it is configured to enhance the learning effect of viewers through AR interaction.

RS4-8	**HIGH-RESOLUTION LIGHT FIELD IMAGE ACQUISITION METHOD FOR HOLOGRAPHIC STEREOGRAM PRINTING SYSTEM**	*639*

Munkh-Uchral Erdenebat	Chungbuk National University
Joon Hyun Kim	Chungbuk National University
Seung-Nam Oh	Chungbuk National University
Anar Khuderchuluun	Chungbuk National University
Nyamsuren Darkhanbaatar	Chungbuk National University
Ki-Chul Kwon	Chungbuk National University
Hoonjong Kang	Wonkwang University
Kwon-Yeon Lee	Sunchon National University
Nam Kim	Chungbuk National University

In this paper, we propose the real object-based fully automatic high-resolution light field image acquisition system using the one-directional moving camera array and smart motor-driven stage. The proposed high-resolution light field image acquisition system includes interconnected multiple cameras with one-dimensional configuration, the multi-functional smart motor and controller, and the computer-based integration between the cameras and smart motor. After the user inputs the main parameters such as the number of perspectives and distance/rotation between each neighboring perspectives, the multiple cameras capture the high-resolution perspectives of the real object automatically, by shifting and rotating on the smart motor-driven stage, and the captured images are utilized for the hogel generation of the holographic stereogram printing system. Finally, the natural-view holographic three-dimensional visualization of the real-object is outputted on the holographic material through the holographic stereogram printing system. The proposed method verified through the optical experiment, and the experimental results confirmed that the proposed one-dimensional moving camera array-based light field image system can be an effective way to acquire the light field images for holographic stereogram printing.

RS4-9	**PRELIMINARY RESEARCH OF FULL-COLOR TRANSMISSION HOLOGRAPHIC OPTICAL ELEMENT FOR HOLOGRAPHIC SOLAR CONCENTRATOR**	*640*

Hui-Ying Wu	Chungbuk National University
Chang-Won Shin	Chungbuk National University
Shariar Md. Imtiaz	Chungbuk National University
Md. Biddut Hossain	Chungbuk National University
Rupali Shindae	Chungbuk National University
Erkhembaatar Dashdavaa	Chungbuk National University
Tuvshinjargal Amgalam	Chungbuk National University
Sang-Keun Gil	Suwon University
Seok-Hee Jeon	Incheon National University
Nam Kim	Chungbuk National University

In this paper, a full-color transmission holographic optical element (HOE) using photopolymer is developed for a holographic solar concentrator. To implement a full-color transmission HOE, the characteristics of the photopolymer are analyzed in red, green, and blue wavelengths respectively. It can improve the average diffraction efficiency when recording full-color HOE by applying recording conditions with high possible diffraction efficiency at a single

wavelength. Also, according to coupled wave theory, the transmission grating has wide wavelength selectivity than reflection grating. It is beneficial to concentrate wide band solar energy using transmission full-color HOE. Here, a full-color HOE lens is fabricated to collect solar energy in one area. Unlike optical lenses, HOE lenses can diffract light in a designed direction. Finally, a full-color HOE lens using the photopolymer is manufactured through the optimized recording conditions, and the diffraction efficiencies in three wavelengths are measured to verify the practicability of the holographic solar concentrator.

RS5   Regular Session: Smart Contents, Systems, Applications

Thursday, 21st July 2022, 10:50 – 12:30

Chair: Thongchai Yooyativong (Mae Fah Luang University, Thailand)

RS5-1   DRM Architecture for NFT Media Access Control in Metaverse Platform   *615*

Sung Il Jang	LSware Inc.
Changjun Choi	LSware Inc.
YongJoon Joe	LSware Inc.
Dong Myung Shin	LSware Inc.

As the metaverse drew attention as the next-generation Internet, various metaverse platforms emerged. And on some metaverse platforms, multiple attempts are made based on NFT. We propose a DRM architecture that must be equipped in a metaverse platform to support NFT when used as a media. And we present DRM architecture's access control and license conditions.

RS5-2   An analysis on threat scenario of market model for secure digital hologram printing content transaction   *617*

| WonBin Kim | LSware Inc. |

Digital hologram printing content refers to digital original data for outputting holograms in the real world. In order to print a hologram in the size of A4 paper, about 10TB of digital hologram printing content is required. Therefore, in order to securely and efficiently trade digital hologram printing contents, it is required to design a market model suitable for largecapacity data transactions. In this study, several market models are designed and threat scenarios appearing in each market model are analyzed. As a result, through threat analysis of various data transaction models, we present the most suitable transaction model for safely and efficiently transacting digital hologram printing contents.

RS5-3   CNN MODEL IMPLEMNTATION AND DOMINANCE COMPARISON FOR FASHION DATA CLASSIFICATION   *641*

Gi Jo Yang	Soongsil University
Hyun Ho Kim	Soongsil University
Ji Won Hwang	Soongsil University
Hoon Chang	Soongsil University

After the COVID-19 pandemic, the second-hand fashion market is growing, led by the younger generation. If we can classify clothes in photos through deep learning, we can provide a better user experience by providing filtering for random posts on used bulletin boards. In this paper, we learn clothes photos provided by Kaggle through CNN-based image classification models (ResNet, VGG) and show the results of

classifying clothes by category. As a result of evaluation through the predictive model performance evaluation index, ResNet with a relatively deeper layer showed better performance.

**RS5-4   DEVELOPMENT OF NATURAL PORTRAIT RIGHT PROTECT   *642*
PROGRAM FOR PICTURE AND VIDEO BASED ON DEEP LEARNING**

Jeongju Yu	Soongsil University
Jeyeon Ae	Soongsil University
Minhoe Kim	Soongsil University
Hoon Chang	Soongsil University

As media consumption grows up, the problem of infringement of the right of portrait of those intentionally or unintentionally filmed in the video is emerging. This happens not only because it is difficult for editors to mosaic every face, but also because the mosaic-processed video lacks aesthetics. Therefore, we felt the need to solve the problem, and developed a technology that can conveniently and aesthetically perform face editing. Machine learning is used to extract all faces from photos and videos, and not only to mosaic them, but also to synthesize the faces of people who do not exist (hereafter, fake faces) generated through GAN with the faces to be covered to create aesthetically heterogeneous faces. We have developed a program that provides anonymization technology that is not It is expected that it will be helpful in the advent of the ethical media era by developing from the existing anonymization through mosaic, satisfying legal issues and aesthetics at the same time, and increasing user accessibility through the ios application.

**RS5-5   DEEP-LEARNING BASED SERENDIPITY BOOK RECOMMENDATION   *670*
FOR BOOK-SHARING**

Youngsun Kwon	Soongsil University
Byeongchan Park	Soongsil University
Youngmo Kim	Soongsil University
Seok-Yoon Kim	Soongsil University

The used goods trading platforms, which are highly affected by local infrastructure industries, are increasing every year with the recent spread of non-face-to-face culture, and in particular, used books are in high demand because the transaction amount is not large. Existing book recommendation algorithms do not consider the user's regional information, making it difficult to apply to book-sharing services, and recommendation satisfaction decreases by recommending only similar items. In this paper, we propose a book recommendation method for book-sharing platforms. This method can reflect the user's past book usage patterns and location characteristics through the BERT model and makes serendipity recommendation possible by recommending popular books in other categories with high similarity.

RS6   Regular Session: Poster

Thursday, 21st July 2022, 10:50 – 12:30

Chair: Jinho Ahn (Hoseo University, Korea)

**RS6-1   EFFICIENT DEPTH ESTIMATION OF MONOCULAR IMAGES USING   *607*
RESNET50, VIT, AND MONODEPTH2**

Woosung Shin	Dankook University
Woori Han	Dankook University
Youngseop Kim	Dankook University

According to Verified Market Research, a demand research firm, the global 3D image market will grow from $15.5 billion in 2020 to $74.5 billion in 2028.[1] This rapid growth can be attributed to an increasing demand for high-resolution visualization and an increasing demand to express the features of images in three dimensions rather than two dimensions.

Convolutional Backbone gradually downsamples input images to extract features via ResNet50[2] on multiple scales, allowing low-level features to be grouped into high-level features and ensuring that the network's memory and computation remain constant. However, features can be lost in high-level networks and these losses cannot be recovered from the decoder.

By utilizing Vision Transformer (ViT)[3] as a backbone architecture, we reconstruct bag-of-word representations provided by ViT into features extracted from images of various resolutions and gradually combine feature representations using convolution. Unlike a complete convolutional backbone, ViT is advantageous for dense prediction tasks because it omits the down-sampling task after the initial image embedding is calculated and maintains feature representation in constant dimensions at all processing steps.

MonoDepth2[4] assumes that the camera used in the self-supervised learning method is moved and the object is stationary, and automasking technology is also presented to solve the problem of holes during actual interference. This method eliminates holes caused by objects moving at the same speed, and increases performance by obtaining a multiscale loss function through upsampling at several stages of decoder.

In this paper, we could achieve high-performance of Depth Estimation results by combining ResNet50, ViT, and MonoDeepth2, complementing the shortcomings that each will have.

RS6-3   INTRA TRIANGLE PREDICTION FOR SCREEN CONTENTS *620*

Heeji Han	Hanbat National University
Jaeryun Choe	Hanbat National University
Daehyeok Gwon	Hanbat National University
Haechul Choi	Hanbat National University

Versatile Video Coding(VVC) is a latest international video coding standard being developed by Joint Video Experts Team and adopts various technologies including screen content coding tools [1][2]. Screen contents often include text, lines, and computer-generated objects, which have many discrete textures and sharp edges [3]. Therefore, a triangular division coding can increase coding efficiency for the screen contents. This paper introduces an intra triangular prediction method based on VVC to efficiently compress the screen contents. The proposed method is similar to Triangular Prediction Mode [4], which supports triangular division prediction in the existing inter prediction coding of VVC, and generates two rectangular prediction blocks using vertical and horizontal prediction modes and neighboring reconstructed reference lines in intra prediction coding. The final prediction signal is produced by weighting the two prediction blocks with a triangular mask. The experimental result of the proposed method shows that when using a 7-tap blender for both triangular masks, the BD-rate decreases by average of 0.45% compared to the VVC test model 6.0 in the All Intra test condition for class F. Additionally, when the 3-tap blender was used, the BD-rate decreased on average by 1.82% in Screen Contents sequences compared to using the 7-tap blender. This proves that a small-sized mask is effective because a large number of blocks with sharp edges occur in the screen content.

RS6-4   BIRDCLEF 2022: SELF-SUPERVISED AUDIO SPECTROGRAM TRANSFORMER

674

Eunsoo Cho	Sogang University
Hayoung Kim	Sogang University
Yoon Seo Chung	Sogang University
i-Hwan Kim	Sogang University

BirdCLEF 2021 was another year of the competition in which off-the-shelve CNN backbones was the main part of the event. This was due to availability of both model architecture and models pretrained on ImageNet, and high accuracy achieved in image classification task. In 2021, EfficientNet achieved the state-of-the-art(SOTA) accuracy in image classification and this was noted in BirdCLEF 2021 as well. Meanwhile, Vision Transformer(ViT) also started to produce SOTA result in image classification. In this STFT-based implementation, audio spectrogram was transformed into 16x16 patches which could be trained on ViT and an F1 score of 0.6736 was achieved. Inspired by STFT Transformer, we have used Self-Supervised Audio Spectrogram Transformer in BirdCLEF challenge. We used an open base model pretrained on AudioSet-2M and Librispeech to train the audio model with given BirdCLEF training data by patch. We also used a different threshold per timeframe to dampen the effect of background noise and achieved F1 score of 0.6823 (public 0.7074).

RS6-5   POLYPHONIC BIRD SOUND CLASSIFICATION WITH CHANNEL ATTENTIONBASED CNN MODEL FOR WEAKLY LABELED DATA

673

Junseok Oh	Sogang University
Eunsoo Cho	Sogang University
i-Hwan Kim	Sogang University

Generally, temporal information is not supplied for sound event classification task. Moreover, sounds can be polyphonic, with multiple classes appearing at once. Bird sound classification is a subtask of this task. In this paper, the three components are described for the pipeline system to train bird sound classification from a weakly-labeled dataset: BirdCLEF 2022 dataset. First, a channel attention-based convolutional bird sound classification system for processing weakly-labeled training data. Second is the preprocessing method for polyphonic bird sound events. Last is the preprocessing method for mitigating data imbalance. Experiments on the BirdCLEF 2022 private test set show that the proposed pipeline system achieves 0.5136 F1 score classification results. The proposed pipeline system offers a 0.0028 F1 score improvement compared to a vanilla system.

RS6-6   Implementation of AI Tracking Agency using Unity ML-Agents ToolKit

662

Seok Ho Han	Wonkwang University
Yong Hwan Lee	Wonkwang University

NPC (Non-Player Character) plays an important role in providing funny elements to players in the game, and recently the implement method through reinforcement learning has been in the spotlight. In this paper, we estimate the AI tracking target by reinforcement learning, and implement a AI-based tracking agency by avoiding traps through Unity ML-Agents Toolkit, and analyze the reaches its goal. The experimental environment is built in Unity engine, and simulations are conducted through a number of experiments. The outstanding performance of the tracking target with avoiding traps is shown with the experiments.

RS6-7   **Simulation for Optimal Installation Location of Campus CCTV using Unity Cinemachine**   *663*

Tae Wook Kim	Wonkwang University
Hye Rim Jo	Wonkwang University
Seok Ho Han	Wonkwang University
Yong Hwan Lee	Wonkwang University

There are many cases in the real world where CCTV is installed and monitered for crime prevention. In this paper, we describe and estimate a decision to install optimal location of campus CCTV. To minimize the blind area of CCTV monitoring, our approach uses digital twin technology to build a university campus into a virtual environment, and simulation is performed using Unity Cinemachine to solve the problem of blind minimization. By simulation, the optimal installation location of CCTV is searched, and the effective CCTV management method is tested by minimizing the blind spots.

RS6-8   **Implementation of Efficient Sound Management with Unity AudioMixer**   *664*

Hyejin Park	Wonkwang University
Kangin Lee	Wonkwang University
Seok Ho Han	Wonkwang University
Yong Hwan Lee	Wonkwang University

Game market is steadily increasing, and sound plays an important role to give player a high sense of immersion in the game. However, there may be a problem that interferes with the user's immersion, such as multiple sounds being played at the same time. To solve the problem, we present and implement an effective sound management method in a game, which utilizes an Unity AudioMixer. This paper shows that the background sound and the sound effect of a player's interaction are effectively reproduced in Unity play mode.

RS6-9   **Implementation of Single Image Reflection Removal**   *665*

Hye Rim Jo	Wonkwang University
Yong Hwan Lee	Wonkwang University

Undesired negative image is often captured in photographs taken across partial reflections such as glass windows and electronic display. In this paper, we present and implement a reflection removal scheme, which estimates the spatial separation and undesirable reflected component. Our approach uses a Gaussian Mixture Model to solve the reflection problem, and outperforms state-of-the-art reflection removal methods in the visual pleasant through comprehensive experiments.

RS7   Regular Session: Poster

Thursday, 21st July 2022, 14:00 – 15:40

Chair: Yong-Hwan Lee (Wonkwang University, Korea)

RS7-3   A Comprehensive Stroke Risk Assessment and Prediction Method based on *644*
Markov Chain Model

Sabina Umirzakova	Gachon University
Shabir Ahmad	Gachon University
Taegkeun Whangbo	Gachon University

Stroke is a human state in which the flow of blood to brain is stopped momentarily which can cause paralysis or in worse case lead to fatality. On average around 13 million of people get stroke out of which approximately 5 million to 6 million die. Owing to the fact, the early-stage prediction is of paramount importance. In this paper, we predict the risk of stroke based on a public dataset of healthcare data of people. We propose a model which estimate the long-term and short-term estimation of risk for people based on markov chain model. We apply Markov chain process to predict the short-term risk and long-term risk and compute a commulative stroke likelihood (CSL) factor. The CSL factor can help the doctors and health practicionars to devise recommendation to patients which can decrease the risk index over time.

RS7-4   Implementation of virtual reality serious game contents for non-surgical *646*
training of strabismus patients and clinical trials for strabismus patient

JeHyun Kim	Gachon University
GiSung Oh	Gachon University
WonJun Jung	Gachon University
Taegkeun Whangbo	Gachon University

As the public's interest in the metaverse increases, the metaverse industry is also actively conducting convergence research with various fields to keep pace with it. In this study, development of VR serious game contents for non-surgical training of strabismus patients and clinical trials of the contents were conducted. The VR serious game contents were implemented in the form of a total of three mini-games, and each game was designed so that when the patient plays, the eyeballs focus on the center and then move away again. There were a total of 5 clinical investigators, and the Near Point of Convergence for each patient was significantly improved to 7.8cm after the clinical trial, compared to the average of 11.4cm before the clinical trial. Therefore, in this study, it was proved that VR serious game contents for non-surgical training of strabismus patients are effective in improving strabismus symptoms.

RS7-5   A PARSIMONIOUS APPROACH TO METAVERSE UX/UI DESIGN FOR *647*
THE SENIOR POPULATION

WonJun Jung	Gachon University
GiSung Oh	Gachon University
Jehyun Kim	Gachon University
Taegkeun Whangbo	Gachon University

Metaverse refers to a three-dimensional virtual world where social, economic, and cultural activities like the real world occur. It is a platform for social, cultural, and economic activity for all ages and around the world. However, older people have difficulties in using metaverse technology. In order to design a UX suitable for older users of metaverse content, we experimented on 25 men and women in their 20s and 50s who had played VR content and metaverse content less than once or twice. As a result of the experiment, metaverse contents obtained high values in the positive items Competence, Sensory and imaginative immersion, Flow, Positive affect, and Positive Experience in the 20s and 50s. In contrast, the negative items such as Tension/Annoyance, Challenge, Negative Affect, and Negative experience. Furthermore, in, Tiredness, returning to reality, it can be seen that virtual reality content obtained high figures. Through this study, it is worthwhile to identify the characteristics of senior users, who may be relatively challenging to adapt to the metaverse environment compared to younger users and use them as data to build their UX/UI in the future.

RS7-6   **Verification of the rehabilitation effectiveness of VR contents for MCI patients using MMSE-KC**   *657*

GiSung Oh	Gachon University
Wonjun Jung	Gachon University
Jehyun Kim	Gachon University
Taegkeun Whangbo	Gachon University

Rehabilitation methods for Mild Cognitive Impairment(MCI) include an invasive method using drugs and a non-invasive method using cognitive intervention or training. In order to respond to various cases of MCI, we need to pay attention to methods using cognitive training in addition to methods for drugs. In this study, we recruited subjects and conducted clinical trials to verify the clinical intervention effectiveness of VR contents produced for the purpose of cognitive training. We measured data through the MMSE-KC test for the patient and normal groups, and conducted repeated measures ANOVA, and as a result, it was confirmed that there was a significant effect in the patient group. This study is meaningful as an empirical case of content creation for the rehabilitation of MCI.

RS7-7   **Analysis of news texts based on LDA topic modeling analysis of structural changes in China's game industry in the covid-19 era**   *660*

Yiqian Han	Gachon University
Wonjun Jeong	Gachon University
Taegkeun Whangbo	Gachon University

In the era of COVID-19 pandemic's public health crisis, the epidemic's outbreak has significantly impacted the industrial and economic development of China and the world. Under the influence of the current era, China's game industry has also been affected. Unlike other industries, the game industry has not stopped developing and growing. Therefore, based on the Latent Dirichlet Allocation (LDA) analysis, this article conducts a textual analysis of Chinese game news during COVID-19. The contribution of this paper is to analyze and study the situation of China's game industry in the era of COVID-19 based on data science.

RS7-8   **A NOVEL OPTIMIZATION METHOD FOR NEURAL NETWORKS**   *666*

Faisal Mehmood	Gachon University
Shabir Ahmad	Gachon University
Taegkeun Whangbo	Gachon University

Deep learning is the branch of machine learning and artificial intelligence (AI) that personates the way humans acquire knowledge. It has played an important role in various fields and aims to solve complex tasks related to computer vision like natural language processing, image classification, object recognition and object detection. In deep learning, training a neural network is a challenging task and many factors depend in terms of accuracy, reliability, robustness, and speed. Training a neural network is tedious task and many factors like optimizers and activation function play an important role. In current literature, there are many deep learning models such as AlexNet, ResNet GoogleNet, MobileNet, VGG, and DenseNet. On the other side, there are many optimizers like Gradient Descent (GD), Stochastic Gradient Descent (SGD), and Adaptive Momentum (Adam). In this study, we made some changes in the current Adam based optimizers by minimizing the cyclic path and used an additional hyper-parameter in the algorithm. While training the neural network, we set the learning rate as minimum and constant. During the experiment, we found out that the proposed methodology is efficient in terms of accuracy as compared to other optimizers. In future we aim to work on various CNN models and perform comparison analysis.

RS7-9   **A GAMIFIED APPROACH TOWARDS SMART WASTE MANAGEMENT USİNG MODEL-BASED REİNFORCEMENT LEARNİNG**   *667*

Shabir Ahmad	Gachon University
Faisal Mehmood	Norwegian University of Science and Technology
Taegkeun Whangbo	Gachon University

In this paper we model an optimal waste management system using a gamified approach for waste collection and disposal using a model-based deep reinforcement learning. The states of the model are the waste amount in bins and the amount of overflow. The actions taken by agents are waste collection and waste disposal and Do-nothing. The objective is to model Deep reinforcement learning model which maximizes the reward and minimizes the penalties of the actions taken by agents. We model our approach using Markov Decision Process and present guidelines of different strategies and algorithm which can be effectively applied to implement the proposed model. The proposed model can encourage the citizen a playful way to get citizen ranking points and en-courage the timely disposal of the different kind of waste which are hazardous for human health. Similarly, it can also allow municipality workers to collect the waste and do not allow any waste overflow.

RS7-10   **Data-Driven Heterogenous Stacking Ensemble Method for Battery Grade Multi-Classification**   *648*

Yong-Jae Ko	Jeju Technopark
Pyae Pyae Phyo	Eindhoven University of Technology
Yung-Cheol Byun	Jeju National University

Estimating battery levels in automatic vehicles helps reduce battery failure and optimize battery life. The ML-based stacking ensemble is approached to predict battery level classification in this paper. Decision tree classifier (DT), AdaBoost classifier (ADA), gradient boosting classifier (GBC), and logistic regression (LR) are selected to integrate our proposed model. The initial proposed model is then optimized by choosing the best parameters during the training of all ML individual models. Time series voltage changes of battery data, grade, and state of charge (SOC) features are used to implement and experiment with the training algorithms. The evaluation is performed and compared between original stacking and final stacking with optimization. Our proposed method with optimization is a crucial technique that could be deployed for various types of batteries. Correspondingly, the proposed framework in this paper may assist the upcoming automotive industry related to electric vehicles.

RS8   Regular Session: Poster

Thursday, 21st July 2022, 16:00 – 17:00

Chair: Inpyo Cho (KETI, Korea)

RS8-1   **Post-Processing for Integrated Visualization of CFD Results about Wind Turbine and Photovoltaics**   *612*

| Inpyo Cho | Korea Electronics Technology Institute |
| Youngchan Kim | Korea Electronics Technology Institute |

Jiwon Oh	Korea Electronics Technology Institute
Jaekyu Lee	Korea Electronics Technology Institute
Kyoungtae Kim	Korea Electronics Technology Institute
SangYub Lee	Korea Electronics Technology Institute

In renewable energy(wind turbine and photovoltaics) design, climate on is a strong location criterion for thermal comfort and energy generation performance. Evaluating the effect of resources on the local climate and vice versa is done by computational fluid dynamics (CFD) methods. However, the final result of each CFD analysis must show only one resource in that simulation and cannot be integrated into SCADA or analysis tools. In order to develop an application for judging and coping with near-future prediction results based on CFD results, a post-processing technique that can parse standardized CFD result formats (such as VTK and CGNS) and visualize them appropriately is required. In this paper, we propose a structure that parses and integrates the results of standardized CFD. In particular, examples of wind turbine and photovoltaics, which are core renewable energy resources, are included.

RS8-2   Graphic techniques of heat vision for solar panel using shader

613

Youngchan Kim	Korea Electronics Technology Institute
Inpyo Cho	Korea Electronics Technology Institute
Jiwon Oh	Korea Electronics Technology Institute
SangYub Lee	Korea Electronics Technology Institute

As a visualization module for thermodynamic analysis of solar panels, we introduce how to implement Shader-based heat vision materials. Load the current temperature status of the solar panel by parsing the vtk file, which is the result of thermodynamic analysis. In the digital twin environment, the shader collects point information for each coordinate and implements color gradation according to the heat vision legend to visually express the temperature state. In this paper, we implement the visualization module using the Unity Editor and check its possibility.

RS8-3   A Study on Virtual Environment for Creation of Synthetic Dataset and Verification of Object Recognition Model

623

Jaekyu Lee	Korea Electronics Technology Institute
Kyoungtae Kim	Korea Electronics Technology Institute
Inpyo Cho	Korea Electronics Technology Institute
SangYub Lee	Korea Electronics Technology Institute

. In this paper, we conducted a study on a virtual environment that can collect synthetic data and verify object recognition artificial intelligence (AI) models. We designed a virtual environment to collect synthetic data, and collected synthetic data based on the designed virtual environment. In addition, an object recognition model was developed using the synthetic data based on transfer learning(TL), and the developed object recognition model was tested in the virtual environment we designed. The research on synthetic data generation and virtual verification in this paper can be extended to various industrial fields.

RS8-4   Introduction to Hybrid Modeling Framework for Microgrid Digital Twin

626

SangYub Lee	Korea Electronics Technology Institute
Jaekyu Lee	Korea Electronics Technology Institute
Inpyo Cho	Korea Electronics Technology Institute

Following the fourth industrial revolution, and with the recent advances in power grid systme, the digital twin concept is attracting of both academia and industry worldwide. A microgrid digital twin (MGDT) refers to the digital representation of a microgrid (MG), which mirrors the behavior of its physical counterpart by using high-fidelity model. The hybrid modeling framework (HMF) proposed in this paper uses the data driven model and the physics based model to accurately predict the amount of power generation resource generation by utilizing the strengths of each model. In a MG environment, it is necessary to accurately predict energy generation and demand to propose an optimal solution that satisfies grid balancing. In this paper, we introduce a framework that can use hybrid modeling to provide an optimal solution in a MG environment.

RS8-5   Microgrid simulation system for energy management system evaluation

627

Minho Kim	Korea Electronics Technology Institute
Taehyoung Kim	Korea Electronics Technology Institute
In-Su YANG	KEPCO E&C
Tae-Young LIM	KEPCO E&C
Kyung Sun Ham	Korea Electronics Technology Institute

As the global climate problem is emerging, energy resources with low carbon emission are in the spotlight, which leads to transition from conventional large-scale power grid into microgrid. There are many challenges in operating microgrid such as power quality, control, and modeling issue. To resolve such challenges, grid-related technologies have been developed recently. For the test of such technologies with low cost and risk, microgrid simulation system is very important. In this paper, a high fidelity microgrid simulation system consisting of energy management system, digital twin, real-time simulator, and power hardware-in-the-loop is developed.

RS8-6   A Study on Exploratory Data Analysis and Anomaly Detection for Fault Diagnosis of Smart Buoy

628

Sungmin Lim	Korea Electronics Technology Institute
Jaekyu Lee	Korea Electronics Technology Institute
Inpyo Cho	Korea Electronics Technology Institute
Sangyub Lee	Korea Electronics Technology Institute

Recently, research on Prognostics and Health Management(PHM) through fault diagnosis has been actively conducted in various fields to ensure stable operation of systems. In this paper, we propose an intelligent fault diagnosis algorithm that evaluates the integrity of sensors and detects failures by applying artificial intelligence technology based on LSTM(Long Short-Term Memory) Autoencoder. In particular, we conducted a study on exploratory data analysis and anomaly detection for fault diagnosis of smart buoy in this paper.

RS8-7   Lightweight Ultrasonic Signal based Flow Measurement System using Efficient Time-of-flight Estimation

629

Seongseop Kim	Korea Electronics Technology Institute
Seungwoo Lee	Korea Electronics Technology Institute
Youngmin Kwon	Korea Electronics Technology Institute

In this paper, we propose a lightweight flow measurement technique to be applied to embedded system for ultrasonic signal-based flow measurement. The proposed algorithm is a ligthweight processing for Time-of-flight(ToF) calculation that can be used in flow measurement. Using this algorithm, we implemented optimization of overall flow measurement processing. The proposed ToF algorithm was analyzed in a MATLAB-based environment using the actually measured ADC signal. As a result, the proposed algorithm had a simple calculation compared to the conventional ToF measurement

method, which is cross-correlation. Also, It was confirmed that the cumulative error compare to the conventional ToF result value is 0.67%, and the execution time was 37.8% faster than the cross-correlation method.

RS8-8   Study of the MachineAtttention Based Image Compression for Video Coding for Machine

681

Kyungro Yoon   Konkuk University

Video Coding for Machine(VCM) is a title of the new standardization activity of MPEG. VCM is intended for machine consumption of video such as in machine vision applications while conventional video coding is intended for human consumption of video such as in TV, mobile broadcasting, or video streaming applications. As the main performance target is focused on machine vision tasks, it may be reasonable to assume that the background or texture with no interest from the viewpoint of machine vision. Therefore, in this paper, we propose and study performance of the twophase image compression. In this compression algorithm, the area with machineattention, in other words, area where machine vision performance is affected by the quality is separated from other area of the image in the first phase, and the two areas are encoded with different parameters in the second phase, so that the maximum compression without affecting the performance of the machine vision tasks can be achieved. As the study results show that the machine vision performance suffers in exchange to the reduction of bitrate, a further study to keep the machine vision performance is needed.

RS8-9   3D Human Keypoint Ground Truth Cosntruction using Multiple Azure Kinects

682

Kyungro Yoon   Konkuk University

In the fast advancing deep learning society, it is very important to have a ground truth and annotated dataset so that the deep learning network can be trained and exploited properly. However, it is very difficul to find a dataset with proper ground truth and annotations. In this paper, we presented our experience on building 3D human keypoint ground truth data using multiple Azure Kinects. Even though, the Azuer Kinects provide 3D human keypoints, the provided keypoint data are often not accurate and contains missing keypoint data. To complement such difficulties, we discuss a method to build a single 3D human keypoint ground truth from multiple unreliable human keypoints, with coordinate conversion and temporal synchronization for compensating missing data and outliers.

RS9   Regular Session: Poster

Thursday, 21st July 2022, 17:00 – 18:00

Chair: Chang Choi (Gachon University, Korea)

RS9-1   Internal temperature estimation of Ultrasonic flow meter Using Time-of-Flight Method

630

Jongseok Yoon   Korea Electronics Technology Institute

Seongseop Kim   Korea Electronics Technology Institute

Youngmin Kwon   Korea Electronics Technology Institute

This paper introduces how to estimate internal temperature of an ultrasonic flow meter. The temperature is estimated using the speed of sound calculated using Absolute Time-of-Flight, which means the propagation time of ultrasonic signals from the transmitter to the receiver. In addition, for more accurate temperature estimation, linear regression between the estimated temperature and the actual temperature data is used. The experiment was conducted in Qmin, 3Qmin, 0.1Qmax, 0.3Qmax, 0.5Qmax, 0.7Qmax, Qmax flow ranges using TI MSP430-FR6043 board and MEMS type temperature sensor, and it was confirmed that this proposed method can estimate internal temperature accurately with error within the range $\pm 1\%$.

RS9-2   **Analysis of EDLC-based Primary Battery Current Consumption Characteristics Considering Operation Patterns in IoT Devices**   *631*

Minji Kang	Korea Electronics Technology Institute
Seongseop Kim	Korea Electronics Technology Institute
Seungwoo Lee	Korea Electronics Technology Institute

This paper presents an analysis of the discharge characteristics of EDLC-based primary battery in accordance with the operating characteristics of IoT devices. To extract discharge characteristics, we analyzed the difference between an EDLC-based primary battery and a primary battery not using EDLC after the experiment. The current consumption pattern of the IoT device used in the experiment has a structure that includes IDLE, Processing, and communication transmission/reception, and we comparatively analyzed the voltage change at this time. As a result, it shows that the voltage recovery time of the EDLC-based primary battery is up to 15 times greater than the regular one, but the average of the maximum voltage regulation is about 11 times less.

RS9-3   **LPWAN based Battery Data Analysis Structure for Primary Battery SOC Estimation of IoT Devices**   *632*

Jinki Ha	Korea Electronics Technology Institute
Seongseop Kim	Korea Electronics Technology Institute
Seungwoo Lee	Korea Electronics Technology Institute

In this paper, we proposed a server-side architecture for analysis of collected data for the development of primary battery state estimation and SOC prediction technology for industrial IoT devices. The proposed architecture was implemented in a python-based environment and the operation was confirmed in the actual LPWAN edge-server structure. As a result, it was confirmed that the proposed structure can be used for analyzing characteristics of battery data, by using voltage, current, temperature, along with parsing of battery data collected from industrial IoT devices and data analysis by characteristics.

RS9-4   **A STUDY OF CALIBRIRATION METHOD FOR ULTRASONIC GAS FLOW METERS**   *634*

Youngmin Kwon	Korea Electronics Technology Institute
Seongseop Kim	Korea Electronics Technology Institute
Seungwoo Lee	Korea Electronics Technology Institute

The ultrasonic residential gas meters is expected to replace the existing diaphragm based mechanical residential gas flow meters because of the high accuracy and excellent durability of elctronic type gas meters. In this paper, we propose the temperature-pressure correction algorithm and 3-point polynomial regression calibration method to improve the measurement accuracy of ultrasonic gas meter. Through experimental comparison with reference flow meter, we show the proposed methods effectively reduces the measurement error.

RS9-5   **LIGHTWEIGHT AND SECURE COMMUNICATION PROTOCOL FOR LPWAN BASED IOT DEVICES**   *635*

| Seungwoo Lee | Korea Electronics Technology Institute |
| Youngmin Kwon | Korea Electronics Technology Institute |

Due to the outstanding characteristics of low power wide area network(LPWAN) such as low power consumption and long range communication, it became one of the most widely deployed connectivity standards in IoT applications. However, secure and reliablie data transmission is still remain a challenge because IoT devices are exposed to various cyberattacks and privacy threats. In this paper, we present the lightweight and secure data transmission protocol for LPWAN based IoT application such as smart metering system.

RS9-6   Continual Learning Pipeline for Solar Power Generation Forecasting Model

643

Jeongtaek Lim	Korea Electronics Technology Institute
Minho Kim	Korea Electronics Technology Institute
Kyung Sun Ham	Korea Electronics Technology Institute
Taehyoung Kim	Korea Electronics Technology Institute

As the depletion of fossil fuels and environmental problems, the importance and necessity of renewable energy is increasing all over the world. Solar energy which is easy to install and can produce electricity with infinite resources is in the spotlight. As the proportion of photovoltaic power generation facilities in the total power generation increases, how to respond to fluctuations caused by photovoltaic facilities becomes important for grid stability. Thus, accurate prediction of solar power generation is essential in order to secure grid stability in consideration of variability. In this paper, continual learning pipeline for solar power generation forecasting model which learns adaptively to changing real facility status is suggested.

RS9-7   MUSIC ROYALTIES DISTRIBUTION STRUCTURE ANALYSIS IN KOREA

629

Youngmin Kim	Korea Electronics Technology Institute
Dong Hwan Kim	CATBELL COMPANY
Sunho Park	CHOROCK SOFT
Byoungsoo Koh	KOREA Creative Content Agency
Hyun Jung	KOREA Creative Content Agency
YongHwa Kim	Korea Electronics Technology Institute
Jisoo Hong	Korea Electronics Technology Institute
Sunghee Hong	Korea Electronics Technology Institute
Jinsoo Jeong	Korea Electronics Technology Institute
Byounghyo Lee	Korea Electronics Technology Institute
Hyeonchan Oh	Korea Electronics Technology Institute

Digital music is one of the most important things in market due to the music royalties distribution in Korea. As the music market such as CD and LP, which was conducted offline, is transformed to the digital music market such as download the music and streaming, the distribution of music royalties starting from online service provider (OSP, e.g. melon, flo, etc.) has come to be a highly important part for music rights holders. One of the most important issues in current music royalties distribution is the unfair way of music royalties due to indiscriminative repeat streaming of digital music. This was originated from proportional distribution of music royalties, which was based on a proportional distribution system according to the share of the total streaming, this could tend to disturb the distribution of music royalties. This paper analyzed the current music royalties distirubtion structure in Korea and USA[1, 2], and will introduce the refinement method of the log specification in detail and the way of music right holders-driven music royalties distribution.

RS10 Regular Session: Smart Contents, Systems, Applications

Friday, 22nd July 2022, 11:00 – 13:00

Chair: Chayapol Kamyod (Mae Fah Luang University, Thailand)

RS10-1   EVALUATION OF DVB-T2 TRANSMISSION SIGNAL MODEL FOR OUTDOOR RECEPTION IN THAILAND

Somsanouk Pathoumvanh	National University of Laos
Sathaporn Promwong	King Mongkut's Institute of Technology Ladkrabang
Thanadol Tiengthong	King Mongkut's Institute of Technology Ladkrabang
Chayapol Kamyod	Mae Fah Luang University

This paper to evaluate the digital TV transmission in Bangkok, Thailand, which broadcast signals in DVB-T2 standard. The measured result to evaluated with example signal within Bangkok area comprising 50 positions in dense urban areas. There are many buildings Including the outskirts of Bangkok which has some of the characteristics the wide-open spaces. Such a measurement signal comprising measuring the average and standard deviation MER measurements in different areas. The impact attenuation of avoidance. And interference in the channel will be displayed. In this purpose of checking the parameters that affect the use digital broadcasts as well. Which can be used to improve networks and design DVB-T2 systems.

RS10-2   DVB-T2 PATH LOSS MODEL FOR DTTB IN URBAN AREA

Myo Myint Maw	Mandalay Technology University
Sathaporn Promwong	King Mongkut's Institute of Technology Ladkrabang
Chayapol Kamyod	Mae Fah Luang University

This paper illustrates the study and the competent comparison of a new Hata path loss model through a method of optimization and calibration in order to use the outcome for the prediction of DVB-T2 broadcasting in an urban area of Suratthani Province, the southern Thailand. The research data were from the measurement of the broadcasting signal within two stations; CH40, the frequency of 626 MHz and CH44, the frequency of 658 MHz where the distance of the transmitted station is 2-7 km. The new Hata path loss model shows the results lower than the original Hata model. The Proposed model is more suitable for creating a predicted model aimed to be more accurate in planning the digital terrestrial television broadcasting network design.

SS1   Special Session: NLP and Chatbot Healthcare

Wednesday, 20th July 2022, 14:00 – 15:40

Chair: Kyungsook Kim (Namseoul University, Korea)

SS1-1   A STUDY ON NON-FACE-TO-FACE WORK EXPERIENCE OF CASE MANAGEMENT SOCIAL WORKERS IN COVID-19 SITUATION: FOCUSING ON ETHICAL DILEMMA   *614*

So Yun Choi	Namseoul University

The purpose of this study is to identify ethical dilemmas related to non-face-to-face work experienced by social workers in charge of case management in the social disaster situation of COVID-19, and to help social workers find ways to take responsibility and play a role for the community in the post-COVID-19 situation. A FGI was conducted in March 2022 for four case managers. As a result of the analysis, the case managers were experiencing ethical dilemmas such as 1) the obligation to provide services to clients and the safety of social workers, 2) poor service quality due to non-face-to-face work, and 3) service restrictions due to social distancing. Finally, this study suggested the direction of case management to prepare for the post- COVID-19 era.

SS1-2   COEEELATION BETWEEN SNS ADDICTION TENDENCY OF UNIVERSITY STUDENTS, DEPRESSION, AND INTERPERSONAL PROBLEMS   *625*

Kyung Sook Kim   Namseoul University

The purpose of this study is to examine the correlation between depression, interpersonal relationship problems, and SNS addiction tendency among college students. The subjects of the study were 146 university students. As a result of analyzing the data, the most used SNS were Instagram 135 people (95.1%), Facebook 59 people (41.5%). There was a significantly positive correlation between SNS addiction tendency and depression problems (r=.549, p<.001) ., interpersonal problems (r=.630, p<.001). Therefore, for the prevention of SNS addiction among college students, an intervention program is needed along with a qualitative evaluation of depression and interpersonal difficulties

SS1-3   **The Degree of Awareness and Practice of Infection in Hospitals During the COVID-19 Pandemic**   *633*

Kyung Sook Kim   Namseoul University

This study is a descriptive survey to investigate the factors influencing university students' perception of digital sexual crimes. We collected data by conducting a survey on 150 university students in Korea, and the average age of the participants was 21.17 years old. As a result of analyzing the data, there were significant differences in the perception of digital sexual crime according to gender (t=5.569, p<.001), whether to live with family members (t=2.895, p=.004), and whether graduated from coeducational high school (F=4.157, p=.007). And we found that factors influencing university students' perceptions of digital sexual crimes were the gender perception on the importance of sexual life (β=-0.437, t=-6.146, p<.001) and the gender attitude toward homosexuality permissibility (β=0.241, t=3.387, p=.001). We proposed a sex education program for university students based on this study to reduce digital sex crimes.

SS1-4   **Implementation of Multi-Turn Chatbot with Weather Information Based on Dialogflow**   *654*

Yeolwoo Sung   Namseoul University

Daeseung Park   Namseoul University

Cheong-Ghil Kim   Namseoul University

As the COVID-19 incident continued for a long time, the demand for non-face-to-face services increased. A general chatbot may not properly grasp a user's question or may operate according to a simple input, making the user uncomfortable. In order to feel like talking to a chatbot, a user needs a multi-turn function to exchange conversations with each other. Recently, various frameworks for implementing chatbots have been developed. Using this framework, chatbots can be implemented simply. In this study, a multi-turn chatbot that provides weather information using Google Dialogflow was implemented.

SS1-5   **A STUDY OF CHATBOT ARCHITECTURE USING AI-BASED INTERVENTION IN MULTI-PURPOSE CHATBOT SERVICE**

Daeseung Park   Namseoul University

Yeolwoo Sung   Namseoul University

Changhyun Jang   Namseoul University

Moon Kyung Bang   Namseoul University

Cheong Ghil Kim   Namseoul University

Recently, with the development of technologies such as big data, machine learning, and artificial intelligence, research on artificial intelligence chat-bots is being actively conducted. In particular, conversational artificial intelligence is rapidly developing based on Natural Language Processing (NLP) technology and various other machine learning technologies. However, in the case of existing chatbot services, each service chatbot has a dependency whose quality changes according to performance. In particular, as for a large-scale multi-chatbot service, there is a problem in that the quality becomes dependent on the multiple service chatbots. This paper a chatbot architecuture using AI-based intervention in multi-purpose chatbot service. The proposed system, in the architecture for managing multiple service chatbots, receives user information and user input data during service operation, and serves as an interface to deliver the

answers derived from the chatbot to the user to query the user. As a result, it can create more easy-to-understand conversation content for a specific chatbot using deep learning.

SS2 Special Session: Smart Contents, Systems, Applications

Thursday, 21st July 2022, 14:00 – 15:40

Chair: SuYeon Kim (Daegu University, Korea)

SS2-1   Intelligent Aquaponics System for Home Using Medaka   *608*

SuYeon Kim   Daegu University

Recently, the aquaponics system has been spotlighted as a futureoriented agriculture. However, most of the currently released systems are composed of a large size scale, and the breeding fish species are also limited to fish species such as carp, crucian carp, and perch, which grow very large. In this study, we intend to propose an aquaponics system using medaka. Medaka has very high temperature resistance and high water quality adaptability, so it is suitable for home aquaponics. Therefore, we designed a smallsized aquaponics system suitable for home use using Medaka.

SS2-2   System design to identify the congestion level of tourist attractions and   *609*
recommend shooting spots using SNS data

SuYeon Kim   Daegu University

Various posts about popular tourist destinations are being posted on social media. Although these posts contain a lot of information about tourist destinations, they are not widely used by people. In this study, we intend to design a system that provides information on the current congestion level of tourist destinations by using SNS data that people are willing to upload, and recommends photo spots to users by using location data where a large number of photos were taken.

SS2-3   Design of rail system for multiple output of personal 3D printer   *610*

SuYeon Kim   Daegu University

With the spread of 3D printers, individuals can also print various models and use them wherever they want. Although the use of personal 3D printers has increased, they are printed at a very slow speed compared to commercial printers. 3D printers require printing for a long time, but even when printing is complete, it is inconvenient to remove the output from the bed and then print again. Therefore, this study intends to provide a rail system that can produce multiple prints at once by manufacturing the existing personal 3D printer bed in the form of a rail.

SS2-4   A system for providing a customized lighting environment to users using smart   *611*
healthcare devices

SuYeon Kim   Daegu University

As the Internet of Things (IoT) technology develops, its application fields have been gradually expanded. In the past, people manually controlled lighting directly, but now it is changing to a form of remote control through IoT technology. However, it only automatically controls the power of the lighting, and does not provide an appropriate illuminance according to the user's condition or mood. In this study, we designed a system that can recognize the current user based on information collected from smart healthcare devices and provide the most appropriate color and brightness of lighting for the user's situation.

SS2-5   **DESİGN OF AUTOMATIC ACCESS CONTROL SYSTEM FOR QUARANTİNE**   *601*

Tae-Ho Nam	Daegu University
Kyung-Ae Cha	Daegu University
Won-Kee Hong	Daegu University

In this paper, we propose a system that can automatically control access through machine learning-based image recognition and non-contact temperature measurement using an infrared temperature sensor. The face mask recognition module was developed in the Raspberry Pi Linux environment to secure portability and simplicity. The trained model was optimized and mounted on the Raspberry Pi, and an integrated system was implemented through Bluetooth communication with the Arduino. The results of the mask recognition rate and the accuracy measurement of body temperature measurement confirmed the effective operation of the designed automatic door control system.

SS3   Special Session: High Performance DSaaS

Friday, 22nd July 2022, 09:30 – 11:10

Chair: Haechul Choi (Hanbat National University, Korea)

SS3-1   **A JUDGMENT METHOD OF COPYRIGHT INFRINGEMENT BASED ON CLOUD STORAGE**   *671*

Seyoung Jang	Soongsil University
Byeongchan Park	Soongsil University
Seok-Yoon Kim	Soongsil University
Youngmo Kim	Soongsil University

Since the most of the recent copyright infringement crimes turn out to avoid crackdowns and investigations through methods such as having servers abroad or using cloud services to disguise the IP of the operating server, etc., copyright infringement cases using cloud services continue to occur. The existing forms of copyright infringement crimes were made in web hard and torrent, where the criminals of copyright infringement can be inferred, but cloud services are now being used as a way to avoid them. In this paper, we propose a judgment method for active investigation of copyright infringement based on cloud storage, which has evolved from the existing form of copyright infringement.

SS3-2   **A STUDY ON APPLICATION OF OTHER MUSIC SERVICE BASED ON TBS MUSIC NETWORK PLATFORM**   *672*

Byeongchan Park	Soongsil University
Seyoung Jang	Soongsil University
Seok-Yoon Kim	Soongsil University
Youngmo Kim	Soongsil University

The existing copyright protection system has a limitation in protecting various music works since it had been established some time ago. In the case of music works that can be accessed through various media such as TV or the Internet, in particular, the absence of the ability to record usage history and the lack in the transparency in the calculation and distribution of copyright fees are major problems of the copyright protection system. To solve this problem, this paper proposes a method to solve the copyright problem of other music service based on the existing TBS music block chain network platform. Since the blockchain transactions on the TBS network contain music usage data, the TBS block chain network platform can be easily expanded to protect the copyrights of various genre music.

SS3-3   A STUDY ON THE PLATFORM FOR TRUST-GUARNATEED   *677*
METAVERS MEIDA SERVICE

Seyoung Jang	Soongsil University
Byeongchan Park	Soongsil University
Seok-Yoon Kim	Soongsil University
Youngmo Kim	Soongsil University

Since the most of the recent copyright infringement crimes turn out to avoid crackdowns and investigations through methods such as having servers abroad or using cloud services to disguise the IP of the operating server, etc., copyright infringement cases using cloud services continue to occur. The existing forms of copyright infringement crimes were made in web hard and torrent, where the criminals of copyright infringement can be inferred, but cloud services are now being used as a way to avoid them. In this paper, we propose a judgment method for active investigation of copyright infringement based on cloud storage, which has evolved from the existing form of copyright infringement.

SS3-4   METADATA STRUCTURE OF USAGE HISTORY FOR TRANSPARENT   *678*
SETTLEMENT AND DISTRIBUTION OF MUSIC

| Mamadalieva Nigorakhon | Namangan State University |
| Ulugbek Ruziev | Namangan State University |

It is difficult to transparently install and distribute music and music musical composition, used in public places such as chain stores, chain of coffee houses and hypermarkets. monitoring of which is also difficult because it is usually outside the content and in different places. In addition, it is difficult to understand the exact usage history due to different rights management information in each associated organization. In this article, we propose a metadata framework for integrating various music rights management information. And recording the usage history information in the blockchain registry in the form of a smart contract, which can be used as usage monitoring information for the transparent settlement and distribution of music and musical composition.

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