

# Jaeyong Kang

Ph.D. in Electrical Engineering and Computer Science

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## Research Interests

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Deep learning, music generation, music information retrieval, affective computing, computer vision, natural language processing, multimodal learning, machine learning, knowledge distillation, agent-based information retrieval, semantic web, social media analysis, and recommender systems.

## Education

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**Gwangju Institute of Science and Technology (GIST), Gwangju, Korea** **Mar. 2009 - Feb. 2017**

- **Ph.D.** in Electrical Engineering and Computer Science
- Thesis: “User Interest Modeling in Social Media for Personalized Services”.
- Advisor: Prof. Hyunju Lee, [hyunjulee@gist.ac.kr](mailto:hyunjulee@gist.ac.kr)
- Formal Advisor: Prof. Kwang Mong Sim, [prof\\_sim\\_2002@yahoo.com](mailto:prof_sim_2002@yahoo.com)

**Changwon National University (CNU), Changwon, Korea** **Mar. 2005 - Feb. 2009**

- **B.S.** in Computer Engineering

## Experience

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**Postdoctoral Researcher** **Dec. 2021 – Feb. 2025**

- Singapore University of Technology and Design (SUTD), Singapore
- Audio, Music, and AI Laboratory (Prof. Dorien Herremans), Information Systems Technology and Design
  - Research topic: AI for music and audio, music generation for video, music emotion recognition, speech denoising.

**Postdoctoral Researcher** **June. 2019 – Nov.2021**

- Korea National University of Transportation (KNUT), Chungju, Korea
- Algorithmic Machine Intelligence Laboratory (Prof. Jeonghwan Gwak), Department of Software
  - Research topic: deep learning-based medical image analysis, anomaly detection, knowledge distillation, fruit freshness classification.

**Research Scientist** **Apr. 2018 – Mar. 2019**

- Department of Radiology, Seoul National University Hospital (SNUH), Seoul, Korea
  - Research topic: deep learning-based medical image analysis

## Publications

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### Ph.D. Thesis

- **Jaeyong Kang**, “User Interest Modeling in Social Media for Personalized Services”, Ph.D. Dissertation, Gwangju Institute of Science and Technology, 2017. [Advisor: Hyunju Lee, Internal Thesis Examiners: Sung Chan Jun, Kuk-Jin Yoon, Sung-Hee Lee, External Thesis Examiners: Xing Xie]

## International Journal

- **Jaeyong Kang**, Dorien Herremans, “Are we there yet? A brief survey of Music Emotion Prediction Datasets, Models and Outstanding Challenges”, arXiv:2406.08809, 2025 (Under review).
- **Jaeyong Kang**, Soujanya Poria, Dorien Herremans, “Video2Music: Suitable Music Generation from Videos using an Affective Multimodal Transformer model”, Expert Systems with Applications, 2024.
- Younghoon Jeon, **Jaeyong Kang**, Byeong C Kim, Kun Ho Lee, Jong-In Song, Jeonghwan Gwak, " Smart Insole-Based Classification of Alzheimer’s Disease Using Few-Shot Learning Facilitated by Multi-Scale Metric Learning", IEEE Transactions on Consumer Electronics, 2024.
- Younghoon Jeon, **Jaeyong Kang**, Byeong C Kim, Kun Ho Lee, Jong-In Song, Jeonghwan Gwak, "Early Alzheimer's Disease Diagnosis using Wearable Sensors and Multilevel Gait Assessment: A Machine Learning Ensemble Approach", IEEE Sensors Journal, 2023.
- **Jaeyong Kang**, Chul-Su Kim, Jeong Won Kang, Jeonghwan Gwak, "Recurrent Autoencoder Ensembles for Brake Operating Unit Anomaly Detection on Metro Vehicles", Computers, Materials & Continua, 2023.
- **Jaeyong Kang**, Jeonghwan Gwak, “Ensemble of Multi-task Deep Convolutional Neural Networks using Transfer Learning for Fruit Freshness Classification”, Multimedia Tools and Applications, 2022.
- YoungHoon Jeon, Thi Kieu Khanh Ho, **Jaeyong Kang**, Byeong C Kim, Kun Ho Lee, Jong-In Song, Jeonghwan Gwak, "Machine learning–based detection model of early Alzheimer's disease using wearable device and gait assessment", Alzheimer's & Dementia, 2021.
- **Jaeyong Kang**, Chul-Su Kim, Jeong Won Kang, Jeonghwan Gwak, "Anomaly Detection of the Brake Operating Unit on Metro Vehicles Using a One-Class LSTM Autoencoder", Applied Sciences, 2021.
- **Jaeyong Kang**, Zahid Ullah, Jeonghwan Gwak, “MRI-based Brain Tumor Classification using Ensemble of Deep Features and Machine Learning Classifiers”, Sensors, 2021.
- **Jaeyong Kang**, Jeonghwan Gwak, “Ensemble Learning of Lightweight Deep Learning Models using Knowledge Distillation for Image Classification”, Mathematics, 2020.
- Junho Ahn, Thi Kieu Khanh Ho, **Jaeyong Kang**, Jeonghwan Gwak, “Using Artificial Intelligence Methods for Dental Image Analysis: State-of-the-Art Reviews”, Journal of Medical Imaging and Health Informatics, 2020.
- **Jaeyong Kang**, Jeonghwan Gwak, “Ensemble of Instance Segmentation Models for Polyp Segmentation in Colonoscopy Images”, IEEE Access, 2019.
- **Jaeyong Kang**, HongSeok Choi, Hyunju Lee, “Deep Recurrent Convolutional Networks for Inferring User Interests from Social Media”, Journal of Intelligent Information Systems, 2019.
- **Jaeyong Kang**, Hyunju Lee, “Modeling User Interest in Social Media using News Media and Wikipedia”, Information Systems, 65, 52-64, 2017.
- **Jaeyong Kang**, Kwang Mong Sim, “Ontology-enhanced Agent-based Cloud Service Discovery”, International Journal of Cloud Computing. 2016.
- **Jaeyong Kang**, Kwang Mong Sim, “A Multiagent Brokering Protocol for Supporting Grid Resource Discovery”, Applied Intelligence, 37(4), 527–542, 2012.

## International Conference

- **Jaeyong Kang**, Dorien Herremans, “Towards Unified Music Emotion Recognition across Dimensional and Categorical Models”, In arXiv:2502.03979, 2025 (Under review).
- Zixun Guo, **Jaeyong Kang**, Dorien Herremans, “A domain-knowledge-inspired music embedding space and a novel attention mechanism for symbolic music modeling”, Proc. of the AAAI Conference on Artificial Intelligence, 2023.
- Zahid Ullah, Thi Kieu Khanh Ho, Hyunseok Lim, **Jaeyong Kang**, Jeonghwan Gwak, "COVID-19 Detection with a Semi-Supervised Adversarial Autoencoder in Chest Radiographs", Proc. of the 16th Asia Pacific International Conference on Information Science and Technology (APIC-IST 2021), Busan, Korea, 2021.
- Thi Kieu Khanh Ho, Hyunseok Lim, **Jaeyong Kang**, Jong-In Song, Jeonghwan Gwak, "A CNN-LSTM Model for Alzheimer’s Disease Multi-Class Classification using Multichannel EEG", Proc. of the 16th Asia Pacific International Conference on Information Science and Technology (APIC-IST 2021), Busan, Korea, 2021 (**Outstanding paper award**).
- Thi Kieu Khanh Ho, Zahid Ullah, Inki Kim, Hyunseok Lim, **Jaeyong Kang**, Jeonghwan Gwak, "Feature Integration for COVID-19 Classification using Chest Radiography", Proc. of the 16th Asia Pacific International Conference on Information Science and Technology (APIC-IST 2021), Busan, Korea, 2021.
- **Jaeyong Kang**, Jeonghwan Gwak, “KD-ResUNet++: Automatic Polyp Segmentation via Self-Knowledge Distillation”, Proc. of MediaEval 2020, Online, 2020.
- **Jaeyong Kang**, Kwang Mong Sim, “A Cloud Portal with A Cloud Service Search Engine”, Proc. of the 2011 International Conference on Information and Intelligent Computing (ICIIC’11), Hong Kong, 2011.
- **Jaeyong Kang**, Kwang Mong Sim, “Towards Agents and Ontology for Cloud Service Discovery”, Proc. of the 2011 International Conference on Cyber-Enabled Distributed Computing and Knowledge Discovery (CyberC’11), Beijing, China, 2011.
- **Jaeyong Kang**, Kwang Mong Sim, “Ontology and Search Engine for Cloud Computing System”, Proc. of the 2011 International Conference on System Science and Engineering (ICSSE’11), Macau, China, 2011.
- **Jaeyong Kang**, Kwang Mong Sim, “Cloudle: An Ontology-enhanced Cloud Service Search Engine”, Proc. of the 2010 International Workshop on Cloud Information System Engineering (CISE’10), Hong Kong, 2010.
- **Jaeyong Kang**, Kwang Mong Sim, “Cloudle: A Multi-criteria Cloud Service Search Engine”, Proc. of the 2010 IEEE Asia-Pacific Service Computing Conference (APSCC’10), Hangzhou, China, 2010.
- **Jaeyong Kang**, Kwang Mong Sim, “Cloudle : An Agent-based Cloud Search Engine that Consults a Cloud Ontology”, Proc. of the 2010 International Conference on Cloud Computing and Virtualization (CCV’10), Singapore, 2010.
- **Jaeyong Kang**, Kwang Mong Sim, “A Brokering Protocol for Agent-Based Grid Resource Discovery”, Proc. of the 2009 International Conference on Grid and Distributed Computing (GDC’09), Jeju Island, Korea, 2009.

## Korean Domestic Journal

- **Jaeyong Kang**, Jeonghwan Gwak, “Deep Learning-Based Brain Tumor Classification in MRI images using Ensemble of Deep Features”, Journal of The Korea Society of Computer and Information, 2021.
- **Jaeyong Kang**, Jeonghwan Gwak, “Embedding similarity-based anomaly detection in crowd scenes via object-centric augmentation”, The Journal of Korean Institute of Next Generation Computing, 2021.
- **Jaeyong Kang**, Jeonghwan Gwak, “Adaptive Face Mask Detection System based on Scene Complexity Analysis”, Journal of The Korea Society of Computer and Information, 2021.

## Korean Domestic Conference

- **Jaeyong Kang**, Inki Kim, Hyunseok Lim, Jeonghwan Gwak, "A Crack Detection of Wooden Cultural Assets using EfficientNet model", Proc. of the Korea Society of Computer and Information Summer Conference 2021, Jeju, Korea, 2021.
- **Jaeyong Kang**, Inki Kim, Hyunseok Lim, Jeonghwan Gwak, "A Bulge Detection Model in Cultural Asset images using Ensemble of Deep Features", Proc. of the Korea Society of Computer and Information Summer Conference 2021, Jeju, Korea, 2021.
- **Jaeyong Kang**, Inki Kim, Hyunseok Lim, Jeonghwan Gwak, "An Embedding Similarity-based Model for Detecting Displacement in Cultural Asset Images", Proc. of the Korea Society of Computer and Information Summer Conference 2021, Jeju, Korea, 2021.
- **Jaeyong Kang**, Inki Kim, Hyunseok Lim, Jeonghwan Gwak, "A Displacement Detection Model in Cultural Asset Images using Object-centric Augmentation", Proc. of the Korea Society of Computer and Information Summer Conference 2021, Jeju, Korea, 2021.
- **Jaeyong Kang**, Inki Kim, Hyunseok Lim, Jeonghwan Gwak, "An Ensemble Deep Learning Model for Measuring Displacement in Cultural Asset images", Proc. of the Korea Society of Computer and Information Summer Conference 2021, Jeju, Korea, 2021.
- Hyunseok Lim, Inki Kim, **Jaeyong Kang**, Jeonghwan Gwak, "Anomaly detection performance improvement technique through weight matrix-based optical flow equalization", Proc. of the Korea Society of Computer and Information Summer Conference 2021, Jeju, Korea, 2021.
- **Jaeyong Kang**, Hyunseok Lim, Xufeng Hu and Jeonghwan Gwak, "Embedding similarity-based crowd anomaly detection using object centric augmentation", Proc. of the Next Generation Computing Conference 2021, Gwangju, Korea, 2021 (**Best paper award**).
- **Jaeyong Kang**, Hyunseok Lim, Dongwook Min, Zahid Ullah, Jeonghwan Gwak, "Anomaly detection system using ResUNet++ based image inpainting method", Proc. of the Next Generation Computing Conference 2021, Gwangju, Korea, 2021.
- **Jaeyong Kang**, Hyunseok Lim, Inki Kim, Zahid Ullah, Jeonghwan Gwak, "Effective data preprocessing for a reconstruction model-based anomaly detection", Proc. of the Next Generation Computing Conference 2021, Gwangju, Korea, 2021.
- Dongwook Min, Hyunseok Lim, Thi Kieu Khanh Ho, **Jaeyong Kang**, Jeonghwan Gwak, "Cough Detection System Using Deep Learning", Proc. of the Next Generation Computing Conference 2021, Gwangju, Korea, 2021.

- Hyunseok Lim, Mingyu Kim, **Jaeyong Kang**, Jeonghwan Gwak, "Performance Comparison of SSIM loss function applied in the GAN-based anomaly detection system", Proc. of the Next Generation Computing Conference 2021, Gwangju, Korea, 2021.
- Inki Kim, Hyunseok Lim, Thi Kieu Khanh Ho, **Jaeyong Kang**, Jeonghwan Gwak, "Imbalanced Dataset training techniques with Hard negative mining and Sample Selection", Proc. of the Next Generation Computing Conference 2021, Gwangju, Korea, 2021.

## Programming Skills

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- **Programming Languages:** Python, Java, C, C++, C#, Ruby, JavaScript, PHP
- **Web Development:** Django, Ruby on Rails, HTML, CSS, Bootstrap, jQuery, XML, JSP, Struts, JSON
- **Data Science and Analysis:** NumPy, SciPy, Pandas, Scikit-Learn, OpenCV, Matplotlib, BeautifulSoup, Scrapy, Music21, and much more
- **Database Management:** SQL, MongoDB
- **Deep learning frameworks:** PyTorch, TensorFlow, Keras, Theano, HuggingFace
- **IDEs:** Eclipse, Microsoft Visual Studio Code, Spyder, PyCharm, Jupyter Notebook/Lab
- **Platforms:** Linux, Mac OS, Windows

## Professional Activities

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### Speaker/Attendee

- The Annual Meeting of the Association for Computational Linguistics (ACL'16), Berlin, Germany, 2016.
- The 31st IEEE International Conference on Data Engineering (ICDE'15), Seoul, Korea, 2015.
- The 23rd International World Wide Web Conference (WWW'14), Seoul, Korea, 2014.
- The IEEE International Conference on Data Mining (ICDM'12), Brussels, Belgium, 2012.
- International Conference on Information and Intelligent Computing (ICIIC'11), Hong Kong, 2011
- International Conference on Cyber-Enabled Distributed Computing and Knowledge Discovery (CyberC'11), Beijing, China, 2011.
- International Conference on System Science and Engineering (ICSSE'11), Macau, China, 2011.
- The 1st International Workshop on Cloud Information System Engineering (CISE'10), Hong Kong, 2010.
- IEEE Asia-Pacific Service Computing Conference (APSCC'10), Hangzhou, China, 2010.
- International Conference on Cloud Computing and Virtualization (CCV'10), Singapore, 2010.
- International Multi-Conference of Engineers and Computer Scientist (IMECS'10), Hong Kong, 2010.
- International Conference on Grid and Distributed Computing (GDC'09), Jeju Island, Korea, 2009.

### Technical Reviewers for International Journals

- International Journal of Cloud Computing (IJCC)
- International Journal of Computational Vision and Robotics (IJCVR)
- International Journal of Manufacturing Technology and Management (IJMTM)
- Information Retrieval Journal (INRT)
- PLOS One
- Scientific Reports
- Sensors
- Mathematics
- World Electric Vehicle Journal
- Computers

### Technical Reviewers for International Conferences

- International Conference on Control Automation & Information Sciences (ICCAIS)

## Teaching Assistant

- Computer Programming, (C/C++), Fall semester, 2005
- Programming Language Project, (JAVA) Spring semester, 2006
- Data Processing (SQL), Fall semester, 2006

## Honors and Awards

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- Grand prize, Best Paper Award, Next Generation Computing Conference 2021.
  - Title: Embedding similarity-based crowd anomaly detection using object centric augmentation.
- First Runner Up, Online Hackathon “AI Data for Panoramic Image of Road Environment”, 2020.
- Qualcomm-GIST Innovation Award (IT Research Paper Award), 2016
  - Title: Modeling User Interest in Social Media using News Media and Wikipedia
- Full Scholarships, GIST, 2009 – 2016
- Student Travel Award for IEEE International Conference on Data Engineering (ICDE), 2015
- First Runner Up, CNU Programming Contest, 2006.
- CNU “NURI” Scholarships for Outstanding Students, 2006 - 2009.

## Patents

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- Method for Modeling User Interest in Social Media, 2017. (Korean Domestic; 1017679510000)

## Languages

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- Korean: Native
- English: Professional proficiency

## Music Training

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- Professional piano player (started since age 6)
- Skilled in Music Composition, Improvisation, and Arrangement

## References

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- **Dr. Dorien Herremans**, Associate Professor, Singapore University of Technology and Design (SUTD), Singapore; [dorien\\_herremans@sutd.edu.sg](mailto:dorien_herremans@sutd.edu.sg)
- **Dr. Jeonghwan Gwak**, Associate Professor, Korea National University of Transportation (KNUT), Korea; [james.han.gwak@gmail.com](mailto:james.han.gwak@gmail.com)
- **Dr. Hyunju Lee**, Professor, Gwangju Institute of Science and Technology (GIST), Korea; [hyunjulee@gist.ac.kr](mailto:hyunjulee@gist.ac.kr)