Prof. Seong Tae Kim

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Research Interest

Interpretable/Explainable deep learning

Data/annotation-efficient deep learning (Active learning, Semi/self-supervised learning)

Deep learning for computer aided medical procedures (Medical image analysis & Computer-assisted intervention)

Research Experience

Assistant Professor (Mar. 2021-present)
- Augmented Intelligence Lab, Department of Computer Science and Engineering, Kyung Hee University, South Korea

Senior Research Scientist (Mar. 2019- Feb. 2021)
- Chair for computer aided medical procedures and augmented reality, Department of Informatics, Technical University of Munich, Munich, Germany
- Advisor: Prof. Nassir Navab

Research Assistant (Feb. 2012-Feb.2019)
- Image and video systems laboratory, Department of Electrical Engineering, KAIST, Daejeon, South Korea

Visiting Researcher (Jan. 2015-Mar. 2015)
- Multimedia laboratory, Department of Electrical and Computer Engineering, University of Toronto, Toronto, Ontario, Canada

Education

Doctor of Philosophy (Mar. 2014-Feb. 2019)
- School of Electrical Engineering, KAIST, Daejeon, South Korea
- Advisor: Prof. Yong Man Ro

Master of Science (Feb. 2012-Feb. 2014)
- Department of Electrical Engineering, KAIST, Daejeon, South Korea

Bachelor of Engineering (Mar. 2008- Feb. 2012)
- School of Electrical Engineering, Korea University, Seoul, South Korea

Awards

SPIE Medical Imaging Robert F. Wagner Best Student Paper Award (2018)
Samsung HumanTech Paper Award (2017)
Research Excellence Award, KAIST (2016-2018)
Honorable mentioned poster award at SPIE Medical Imaging (2015)

Professional Service

- **Associate Editor** of IEEE Transactions on Circuits and Systems for Video Technology (2022-present)
- **Area Chair** of MICCAI (2022-2023)
- **Program Committee/Reviewer**: AAAI, CVPR, ICCV, ECCV, ICLR, NeurIPS, ICML, IJCAI

Publications

† denotes corresponding author

International Journal

[J15] Samra Irshad, Douglas P. S. Gomes, **Seong Tae Kim**†, "Improved Abdominal Multi-Organ Segmentation via 3D Boundary-Constrained Deep Neural Networks," *IEEE Access*, vol. 11, pp. 35097-35110, 2023

[J14] Felix Buchert, Nassir Navab, **Seong Tae Kim**†, "Towards Label-Efficient Neural Network Training: Diversity-based Sampling in Semi-Supervised Active Learning," *IEEE Access*, vol. 11, pp. 5193-5205, 2023

[J13] Junho Kim, Seongyeop Kim, **Seong Tae Kim**, Yong Man Ro, "Robust Perturbation for Visual Explanation: Cross-checking Mask Optimization to Avoid Class Distortion," *IEEE Transactions on Image Processing (TIP)*, vol. 31, pp. 301-313, 2022

[J12] **Seong Tae Kim**†, Umut Küçükaslan, Nassir Navab, "Longitudinal Brain MR Image Modeling using Personalized Memory for Alzheimer's Disease," *IEEE Access*, vol. 9, pp. 143212-133221, 2021

[J11] Jung Uk Kim, **Seong Tae Kim**, Hong Joo Lee, Sangmin Lee, and Yong Man Ro, "CUA Loss: Class Uncertainty-Aware Gradient Modulation for Robust Object Detection," *IEEE Transactions on Circuits and Systems for Video Technology,* vol. 31, no. 9, pp. 3529-3543, 2021

[J10] Maria Tirindelli, Maria Victorova, Javier Esteban, **Seong Tae Kim**, David Navarro-Alarcon, Yong Ping Zheng, Nassir Navab, "Force-ultrasound fusion: Bringing spine robotic-US to the next "level"," *IEEE Robotics and Automation Letters*, vol. 5, no. 4, pp.5661-5668, 2020 (presented at **IROS** 2020).

[J9] Leslie Ching Ow Tiong, **Seong Tae Kim**, and Yong Man Ro, "Multimodal Faical Biometrics Recognition: Dual-stream Convolutional Neural Networks with Multi-feature Fusion Layers," *Image and Vision Computing*, vol. 102, 2020.

[J8] Hong Joo Lee, **Seong Tae Kim**, Hakmin Lee, and Yong Man Ro, "Lightweight and effective facial landmark detection using adversarial learning with face geometric map generative network," *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 30, no. 3, pp. 771-780, *2020.*

[J7] **Seong Tae Kim** and Yong Man Ro, "Attended relation feature representation of facial dynamics for facial authentication," *IEEE Transactions on Information Forensics and Security*, vol. 14, no. 7, pp. 1768-1778, 2019.

[J6] Leslie Ching Ow Tiong, **Seong Tae Kim**, and Yong Man Ro, "Implementation of Multimodal Biometric Recognition via multi-feature deep learning networks and feature fusion," *Multimedia Tools and Applications*, vol. 78, pp. 22743-22772, 2019.

[J5] **<u>Seong Tae Kim</u>**, Jae-Hyeok Lee, Hakmin Lee, and Yong Man Ro, "Visually interpretable deep network for diagnosis of breast masses on mammograms," *Physics in Medicine and Biology*, vol. 63, no. 23, pp. 235025, 2018.

[J4] Dae Hoe Kim, **<u>Seong Tae Kim</u>**, Jung Min Chang, and Yong Man Ro, "Latent feature representation with depth directional long-term recurrent learning for breast masses in digital breast tomosynthesis," *Physics in Medicine and Biology,* vol. 62, pp. 1009-1031, 2017.

[J3] **<u>Seong Tae Kim</u>**, Dae Hoe Kim, and Yong Man Ro, "Detection of masses in digital breast tomosynthesis using complementary information of simulated projection," *Medical Physics*, vol. 42, pp. 7043-7058, 2015.

[J2] Dae Hoe Kim, **<u>Seong Tae Kim</u>**, and Yong Man Ro, "Improving mass detection using combined feature representations from projection views and reconstructed volume of DBT and boosting based classification with feature selection," *Physics in Medicine and Biology*, vol. 60, pp. 8809-8832, 2015.

[J1] **<u>Seong Tae Kim</u>**, Dae Hoe Kim, and Yong Man Ro, "Breast mass detection using slice conspicuity in 3D reconstructed digital breast volumes," *Physics in Medicine and Biology*, vol. 59, pp. 5003-5023, 2014.

International Conference

[C38] Yong Hyun Ahn, Gyeong-Moon Park[†], **<u>Seong Tae Kim</u>**[†], "LINe: Out-of-Distribution Detection by Leveraging Important Neurons," IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR**), 2023 **[AI-Top Conference]**

[C37] Jung Uk Kim, Seong Tae Kim, "Towards Robust Audio-based Vehicle Detection via Importance-aware Audio-Visual Learning," International Conference on Acoustics, Speech, and Signal Processing (**ICASSP**), 2023

[C36] Ashkan Khakzar, Yawei Li, Yang Zhang, Mirac Sanisoglu, **<u>Seong Tae Kim</u>**, Mina Rezaei, Bernd Bischl, Nassir Navab, "Analyzing the Effects of Handling Data Imbalance on Learned Features by Looking Into the Models," ICML Interpretable Machine Learning in Healthcare Workshop (**ICML Workshop**), 2022

[C35] Felix Buchert, Nassir Navab, **<u>Seong Tae Kim</u>**[†], "Exploiting Diversity of Unlabeled Data for Label-Efficient Semi-Supervised Active Learning," International Conference on Pattern Recognition (**ICPR**), 2022 **[BK21Plus CS Conference]**

[C34] Yang Zhang, Ashkan Khakzar, Yawei Li, Azade Farshad, **<u>Seong Tae Kim</u>**[†], Nassir Navab, "Fine-Grained Neural Network Explanation by Identifying Input Features with Predictive Information" *Conference on Neural Information Processing Systems (**NeurIPS**),* 2021. **[AI-Top Conference]**

[C33] **<u>Seong Tae Kim</u>**, Leili Goli, Magdalini Paschali, Ashkan Khakzar, Matthias Keicher, Tobias Czempiel, Egon Burian, Rickmer Braren, Nassir Navab, Thomas Wendler, "Longitudinal Quantitative Assessment of COVID-19 Infection Progression from Chest CTs," *International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**)*, 2021. **[BK21Plus CS Conference]**

[C32] Ashkan Khakzar, Sabrina Musatian, Jonas Buchberger, Icxel Valeriano Quiroz, Nikolaus Pinger, Soroosh Baselizadeh, **<u>Seong Tae Kim</u>**[†], Nassir Navab, "Towards Semantic Interpretation of Thoracic Disease and COVID-19 Diagnosis Models," *International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**)*, 2021. **[BK21Plus CS Conference]**

[C31] Ashkan Khakzar, Yang Zhang, Wejdene Mansour, Yuezhi Cai, Yawei Li, Yucheng Zhang, **<u>Seong Tae Kim</u>**[†], Nassir Navab, "Explaining COVID-19 and Thoracic Pathology Model Predictions by Identifying Informative Input Features," *International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**)*, 2021. **[BK21Plus CS Conference]**

[T30] Tobias Czempiel, Magdalini Paschali, Daniel Ostler, **<u>Seong Tae Kim</u>**, Benjamin Busam, Nassir

Navab, "OperA: Attention-Regularized Transformers for Surgical Phase Recognition," *International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**)*, 2021. **[BK21Plus CS Conference]**

[C29] Ashkan Khakzar, Soroosh Baselizadeh, Saurabh Khanduja, Christian Rupprecht, **Seong Tae Kim**[†], Nassir Navab, "Neural Response Interpretation through the Lens of Critical Pathways," *IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR**)*, 2021. **[AI-Top Conference]**

[C28] Tetiana Klymenko, **Seong Tae Kim**, Kirsten Lauber, Christopher Kurz, Guillaume Landry, Nassir Navab, Shadi Albarqouni, "Butterfly-Net: Spatial-Temporal Architecture for Medical Image Segmentation," *IEEE International Symposium on Biomedical Imaging (**ISBI**)*, 2021.

[C27] Abinav Ravi Venkatakrishnan, **Seong Tae Kim**[†] (equally contributed), Rami Eisawy, Franz Pfister, Nassir Navab, "Self supervised Out of distribution detection in Brain CT scans," *Medical Imaging meets NeurIPS (**NeurIPS Workshop**)*, 2020.

[C26] Tobias Czempiel, Magdalini Paschali, Matthias Keicher, Walter Simson, Hubertus Feussner, **Seong Tae Kim**, Nassir Navab, "TeCNO: Surgical phase recognition with multi-stage temporal convolutional networks," *International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**)*, 2020. **[BK21Plus CS Conference]**

[C25] Stefan Denner, Ashkan Khakzar, Moiz Sajid, Mahdi Saleh, Ziga Spiclin, **Seong Tae Kim**[†], Nassir Navab, "Spatio-temporal learning from longitudinal data for multiple sclerosis lesion segmentation," *BrainLes in International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**)*, 2020.

[C24] Hakmin Lee, Hong Joo Lee, **Seong Tae Kim**, Yong Man Ro, "Robust Ensemble Model Training via Random Layer Sampling Against Adversarial Attack," *British Machine Vision Conference (**BMVC**)*, 2020.

[C23] Jung Uk Kim, **Seong Tae Kim**, Eun Sung Kim, Sang-Keun Moon, Yong Man Ro, "Towards high-performance object detection: Task-specific design considering classification and localization separation," *International Conference on Acoustics, Speech, and Signal Processing (**ICASSP**)*, 2020.

[C22] Hyebin Lee, **Seong Tae Kim**, and Yong Man Ro, "Building a breast-sentence dataset: Its usefulness for computer-aided diagnosis," ***ICCV Workshop** on Visual Recognition for Medical Images*, 2019.

[C21] Hakmin Lee, **Seong Tae Kim**, Jae-Hyeok Lee, and Yong Man Ro, "Realistic breast mass generation through BIRADS category," *International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**)*, 2019. **[BK21Plus CS Conference]**

[C20] Hyebin Lee, **Seong Tae Kim**, and Yong Man Ro, "Generation of multimodal generation using visual word constraint model for explainable computer-aided diagnosis," ***MICCAI Workshop** on Interpretability of Machine Intelligence in Medical Image Computing*, 2019.

[C19] Jae-Hyeok Lee, **Seong Tae Kim**, and Yong Man Ro, "ProbeNet: Probing Deep Networks," *International Conference on Image Processing*, 2019.

[C18] **Seong Tae Kim**, Jae-Hyeok Lee, and Yong Man Ro, "Visual evidence for interpreting diagnostic decision of deep neural network in computer-aided diagnosis," *SPIE Medical Imaging*, 2019.

[C17] **Seong Tae Kim** and Yong Man Ro, "Facial dynamics interpreter network: What are the important relations between local dynamics for facial trait estimation?," *European Conference on Computer Vision (**ECCV**)*, 2018. **[AI-Top Conference]**

[C16] Jae-Hyeok Lee, **Seong Tae Kim**, Hakmin Lee, and Yong Man Ro, "Feature2Mass: Visual feature processing in latent space for realistic labeled mass generation," ***ECCV Workshop** on Bio-image Computing,* 2018.

[C15] **Seong Tae Kim**, Hakmin Lee, Hak Gu Kim, and Yong Man Ro, "ICADx: interpretable computer

aided diagnosis of breast masses," *SPIE Medical Imaging*, 2018. **[Robert F. Wagner Best Student Paper Award]**

[C14] Tae Kwan Lee, Wissam J Baddar, **Seong Tae Kim**, Yong Man Ro, "Convolution with logarithmic filter groups for efficient shallow CNN," *International Conference on Multimedia Modeling,* 2018.

[C13] Hongju Lee, Wissam Baddar, Hak Gu Kim, **Seong Tae Kim**, and Yong Man Ro, "Teacher and student joint learning for compact facial landmark detection network," *International Conference on Multimedia Modeling,* 2018.

[C12] **Seong Tae Kim**, Yeoreum Choi, and Yong Man Ro, "Multi-scale facial scanning via spatial LSTM for latent facial feature representation," *International Conference of the Biometrics Special Interest Group,* 2017.

[C11] Geonmo Gu, **Seong Tae Kim**, and Yong Man Ro, "Adaptive attention fusion network for visual question answering," *IEEE International Conference on Multimedia and Expo (ICME)*, 2017.

[C10] **Seong Tae Kim**, Dae Hoe Kim, Yong Man Ro, "Spatio-temporal representation for face authentication by using multi-task learning with human attributes," *IEEE International Conference on Image Processing (ICIP),* 2016.

[C9] Wissam Baddar, Jisoo Son, Dae Hoe Kim, **Seong Tae Kim**, Yong Man Ro, "A deep facial landmarks detection with facial contour and facial components constraint," *IEEE International Conference on Image Processing (ICIP),* 2016**.**

[C8] **Seong Tae Kim**, Dae Hoe Kim, and Yong Man Ro, "Facial dynamic modelling using long-short term memory network: Analysis and application to face authentication," *IEEE International Conference on Biometrics: Theory, Applications, and Systems (BTAS)*, 2016.

[C7] Dae Hoe Kim, **Seong Tae Kim**, and Yong Man Ro, "Latent feature representation with 3-D Multi-view convolutional neural network for bilateral analysis in digital breast tomosynthesis," *IEEE International Conference on Acoustics, speech and signal processing (**ICASSP**)*, 2016.

[C6] **Seong Tae Kim**, Dae Hoe Kim, Dong Jin Ji, and Yong Man Ro, "Region matching based on local structure information in ipsilateral digital breast tomosynthesis views," IEEE International Conference on Image Processing *(ICIP),* 2015.

[C5] Dae Hoe Kim, **Seong Tae Kim**, Wissam J Baddar, and Yong Man Ro, "Feature extraction from bilateral dissimilarity in digital breast tomosynthesis reconstructed volume," *IEEE International Conference on Image Processing (ICIP)*, 2015. **[Selected as Top 10% paper]**

[C4] **Seong Tae Kim**, Dae Hoe Kim, and Yong Man Ro, "Combination of conspicuity improved synthetic mammograms and digital breast tomosynthesis: A promising approach for mass detection," *SPIE Medical Imaging*, 2015.

[C3] Dae Hoe Kim, **Seong Tae Kim**, and Yong Man Ro, "Feature extraction from inter-view similarity of DBT projection views," *SPIE Medical Imaging*, 2015. **[Honorable Mention Poster Award]**

[C2] **Seong Tae Kim**, Dae Hoe Kim, and Yong Man Ro, "Generation of conspicuity-improved synthetic image from digital breast tomosynthesis," *International Conference on Digital Signal Processing*, 2014.

[C1] **Seong Tae Kim**, Dae Hoe Kim, Eun Suk Cha, and Yong Man Ro, "Mass detection based on pooled mass probability map of 3D reconstructed slices in digital breast tomosynthesis," *IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI),* 2014.