Sangpil Kim (Ph.D. Candidate)

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Research Interest

My research focuses on perception and prediction of human behavior and objects. My research area is in the interdisciplinary of computer vision, computer graphics, and deep learning, which specifically, includes conditional generative model, hand pose estimation, view synthesis, dataset creation, and multimodal fusing.

Education

Purdue University — 2015 - 2020
 Ph.D. in Computer Engineering
 Advisor: Prof. Karthik Ramani
 Thesis: Modeling deep neural networks for object generation and human understanding from multiple modalities

Korea University — 2008 - 2015
 Major: Computer Science

Research Experience

Research Assistant — Jan. 2016 - Current
Purdue University at West Lafayette, IN

- Designed human and object pose estimators, generative models, novel view synthesis, dataset creation, and perception algorithm analysis for artificial intelligence systems.

Research Scientist Intern — Dec. 2019 - May. 2020
Facebook Reality Lab at Redmond, WA
- Researched on human understanding with novel mesh model representation for deep neural networks.

Industry Experience

Software Engineering Intern — May. 2018 - Aug. 2018
Nvidia at Santa Clara, CA

- Developed object detection algorithm with deep neural networks for smart city.

Software Engineer

TmaxSoft at Seoul, South Korea — Mar. 2015 - May.2015
- Developed power point software with C++.

Military Experience

Staff Sergeant — Dec. 2009 - Feb. 2012
Republic of Korea Air Force at South Korea

- Leaded 20 air force soldiers for securing Korea airspace.

Publications

[1] First-Person View Hand Segmentation of Multi-Modal Hand Activity Video Dataset.
In proceedings of the 31st British Machine Vision Conference (BMVC) — Lead Author

[2] A Large-scale Mechanical Components Benchmark for Deep Neural Networks.
In proceedings of 16th European Conference on Computer Vision (ECCV) — Lead Author

[3] Object synthesis by learning part geometry with surface and volumetric representations. Computer-Aided Design, Accepted in 2020 Volume 130	Lead Author
[4] Latent transformations neural network for object view synthesis. The Visual Computer 35 (2019), 1-15	Lead Author
[5] CT-GAN: Conditional Transformation Generative Adversarial Network for Image Attribute Modification. In proceedings of 15th European Conference on Computer Vision (ECCV), Demo Session	Lead Author
[6] Learning hand articulations by hallucinating heat distribution. In proceedings of the IEEE International Conference on Computer Vision (ICCV), 3104-3113	2nd Author
[7] Enet: A deep neural network architecture for real-time semantic segmentation. 766 citations, arXiv	3rd Author

Professional Service

ICCGI 2020 Technical Program Committee
Transactions on Pattern Analysis and Machine Intelligence Reviewer
Computer Aided Journal Reviewer
BMVC 2020 Reviewer

Talks

Guest Lecturer, Purdue University
Introduction of Deep Learning - Deep Learning BME 595

Coursework

Artificial Intelligence, Deep Learning, Statistical Machine Learning, Computational Models and Methods, Random Variables, Linear Algebra, Optimization Methods for Systems and Control, Econometrics, Principles Digital Color Imaging Systems, Design of Experiment, Embedded Systems, Fault Tolerant Comp System Design

Selected Project

1. Developed LSTM from gradient calculation to updating weights from scratch with Lua.
2. Implemented character base image description neural networks with Lua.
3. Replicated PredNet for future sequence prediction from scratch.
4. Worked on reinforcement learning acceleration with future sequence prediction.
5. Scraped images from web and analyzed the noise effect on classification task.
6. Synchronized Azure Kinect and Boson 320 LWIR camera with C++.
7. Analyzed feature vectors from images with PCA and t-SNE.
8. Coded re-meshing pipeline for converting a sparse mesh into uniform dense mesh.

Technical Strength

Languages	C#/C++/C, Python, JavaScript, MATLAB, Bash, HTML, CUDA, SQL
Python Tools	Numpy, Scipy, Matplotlib, Pandas, Multiprocessing, BeautifulSoup
Machine Learning	PyTorch, Torch, TensorFlow, Caffe2, scikit-learn, Keras
Computer Vision	OpenCV, MeshLab, PCL
Other Tools	Unity, Blender, Docker, Linux, Visual Studio, WordNet, word2Vec

References

[1] **Kim, S.**, Chi, H. G., Hu, X., Vegesana, A., & Ramani, K. First-Person View Hand Segmentation of Multi-Modal Hand Activity Video Dataset. In proceedings of the 31st British Machine Vision Conference

[2] **Kim, S.***, Chi, H. G.*, Hu, X., Huang, Q., & Ramani, K. A Large-scale Annotated Mechanical Components Benchmark for Classification and Retrieval Tasks with Deep Neural Networks. In proceedings of 16th European Conference on Computer Vision

[3] **Kim, S.**, Chi, H. G., Lin, G., & Ramani, K. (2020). Object synthesis by learning part geometry with surface and volumetric representations." Computer-Aided Design, Accepted Volume 130

[4] **Kim, S.**, Winovich, N., Chi, H. G., Lin, G., & Ramani, K. (2019). Latent transformations neural network for object view synthesis. The Visual Computer, 1-15.

[5] **Kim, S.**, Winovich, N., Lin, G., & Ramani, K. (2018). CT-GAN: Conditional Transformation Generative Adversarial Network for Image Attribute Modification. arXiv preprint arXiv:1807.04812.

[6] Choi, C., **Kim, S.**, & Ramani, K. (2017). Learning hand articulations by hallucinating heat distribution. In Proceedings of the IEEE International Conference on Computer Vision (pp. 3104-3113).

[7] Paszke, A., Chaurasia, A., **Kim, S.**, & Culurciello, E. (2016). Enet: A deep neural network architecture for real-time semantic segmentation. arXiv preprint arXiv:1606.02147.