Hyoungjun "Peter" Park

Curriculum Vitae

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Research Interests

Deep-learning-enabled techniques that improve signal-processing or computational modeling in neuroscience/biology research, in fields such as, but not limited to, super-resolution, automated segmentation, and tracing of biological tissue.

Education

2015–2017 Zürich, Switzerland
ETH Zürich and University of Zürich, MSc, Neural Systems and Computation.
- Thesis: *Rabies-virus-based mapping of whisker-muscle-related cortical areas* (Grade – 5.5/6.0)
- Conducted the master thesis project at the Max Planck Institute for Neurobiology of Behavior (2017-2018).

2010–2015 Cambridge, USA
Massachusetts Institute of Technology, BSc, Brain and Cognitive Sciences.
- Relevant Coursework: Computational Cognitive Science, Computational Aspects of Biological Learning, Neuroanatomy
- One year (2012) on medical leave.

Experience

Nov. 2018 – Feb. 2022 Daejeon, South Korea
Research Scientist, Korea Advanced Institute of Science and Technology, Bio-Imaging, Signal Processing & Learning Lab, Dr. Jong Chul Ye.
- Implemented deep-learning methods for super-resolution in fluorescence microscopy and automatic segmentation of biological tissues.
- First author on two journal articles: *Nature Communications* and *IEEE Transactions on Computational Imaging*.
- 3 years of scientific research in fulfillment of South Korea's mandatory military service.

Apr. 2017 – June 2018 Bonn, Germany
Graduate Researcher, Max Planck Institute for Neurobiology of Behavior, In-Silico Brain Sciences group, Dr Marcel Oberlaender.
- Modeled neuronal populations of whisker-muscle-related cortical areas via retrograde tracing.
- Built image processing module that reconstructs standard reference frames of cortical structure and registers neuronal morphologies.

Feb 2015 – July 2016 Boston, USA
Undergraduate Researcher, MGH and Harvard Medical School, Center for Genomic Medicine, Dr Rakesh Karmacharya.
- Implemented statistical analysis in perturbational profiling of metabolites in patient fibroblasts in search of potential biomarkers for Bipolar Disorder and Schizophrenia.
- Contributing author on two journal articles: *Journal of Proteome Research* and *Molecular Neuropsychiatry*.

April 2014 – Dec. 2014 Cambridge, USA
Research Assistant, McGovern Institute for Brain Research, MIT, Graybiel Laboratory, Dr. Ann Graybiel.
- Assisted research on the role of striosome-targeting corticostriatal circuits on decision-making.
- Managed data acquisition from habituation and trial stages on rats with optogenetic equipment.

Publications

Park, H., Na, M., Kim, B., Park, S., Kim, K.H., Chang, S., and Ye, J.C., Deep learning enables reference-free isotropic super-resolution for volumetric fluorescence microscopy, *Nature Communications*, 2022

*Lim, S., ***Park, H.**, Lee, S.E., Chang, S., Sim, B., and Ye, J.C., CycleGAN with a blur kernel for deconvolution microscopy: optimal transport geometry, *IEEE Transactions on Computational Imaging*, 2020

(*) denotes equal contribution.

Huang, J.H., **Park, H.**, Iaconelli, J., Berkovitch, S.S., Watmuff, B., McPhie, D., Öngür, D., Cohen, B.M., Clish, C.B., and Karmacharya, R., Unbiased Metabolite Profiling of Schizophrenia Fibroblasts under Stressful Perturbations Reveals Dysregulation of Plasmalogens and Phosphatidylcholines, *Journal of Proteome Research*, 2017

Huang, J.H., Berkovitch, S.S., Iaconelli, J., Watmuff, B., **Park, H.**, Chattopadhyay, S., McPhie, D., Öngür, D., Cohen, B.M., Clish, C.B., and Karmacharya, R., Perturbational Profiling of Metabolites in Patient Fibroblasts Implicates α-Aminoadipate as a Potential Biomarker for Bipolar Disorder, *Molecular Neuropsychiatry*, 2016

Presentations

Park, H. and Ye, J.C., Segmentation of neuronal cell bodies based on intrinsic radial property, Poster presentation at the *IEEE International Symposium on Biomedical Imaging (ISBI) Deep Image Analysis and Understanding: from Applications to Products Workshop*, 2020

Park, H., Na, M., Chang, S., and Ye, J.C., Annotation-free segmentation of neuronal cell bodies from a large-scale 3D neuron image using deep neural networks, Poster presentation at the *International Conference on Computer Vision (ICCV) Learning for Computational Imaging Workshop*, 2019

Lim, S, **Park, H.**, and Ye, J.C., CycleGAN for deconvolution microscopy for improved neuron segmentation, Poster presentation at the *International Brain Research Organization (IBRO) World Congress of Neuroscience*, 2019

Editorial Service

Reviewer for IEEE Transactions on Medical Imaging

Skills

Programming	Python, JAVA, R, Church
Frameworks	PyTorch, Tensorflow, ImageJ, Amira
Experiment	Behavior experiment protocols for mammalian animals
Languages	English, Korean, German

Extra

2022	3rd place in the Entrepreneurs' League hosted by Bluepoint, a South Korean VC
2017–2021	Technical consultant for Yolk, a social tech venture featured in *Time* mag. 2019

References

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