Natalia (Natasha) Antropova

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The University of Chicago

Education

The University of Chicago ***2014 – present***
Ph.D. in Medical Physics
Relevant classes: Introduction to Machine Learning, Fundamentals of Deep Learning, Deep Reinforcement Learning Bootcamp, Physics of Medical Imaging (MRI, ultrasound, CT, nuclear imaging, radiography), Medical Imaging Laboratory, Radiation Therapy, Radiation Biology

University of Wisconsin – Madison ***2010 – 2014***
***Bachelor of Science* in Applied Math, Electrical Engineering, and Physics**

Work and Research Experience

Hologic Inc.
Computer Aided Diagnosis Research Group ***Summer 2017***
Intern *Advisor: Haili Chui*

- Introduced and evaluated deep learning-based object detection methods using Tensorflow Object Detection API.
- Developed lung nodule detection system based for CT scans.

The University of Chicago, Committee on Medical Physics
Computer Aided Diagnosis/Radiomics Research Group ***2014 – present***
Thesis project *Advisor: Dr. Maryellen Giger*

- Developed a novel end-to-end deep learning pipeline for characterizing breast dynamic-contrast enhanced MRI (DCE-MRI), significantly outperforming the state of the art on multiple tasks within computer-aided diagnosis.
- Established a data-intensive image processing methodology involving raw 3D/4D MRI in conjunction with unstructured clinical data, resulting in cleanly structured datasets optimized for image analysis.
- Pioneered transfer- and multi-task learning methods to solve challenges involving temporal data, heterogeneous data sources, small datasets, and patient-level inference.
- Analyzed the robustness of analytical image features across heterogeneous DCE-MRI datasets.

The University of Chicago, Committee on Medical Physics
CT Image Reconstruction Research Group ***Spring 2015***
Rotation Project *Advisor: Dr. Xiaochuan Pan*

- Developed Python software to reconstruct 3D CT images from projection data.
- Evaluated image reconstruction methods for dedicated breast CT system and engineered a new efficient reconstruction methodology.

University of Wisconsin, Madison, Medical Physics Department
Biomagnetism Research Group ***2011 – 2014***
Research Assistant *Advisor: Dr. Ron Wakai*

- Collected, processed, and analyzed fetal magnetic heart signals in magnetocardiography.
- Designed a hardware probe and developed software to infer 3D information from 2D ultrasound scans and position of the probe attached to ultrasound transducer.

Honors and Awards

Winner, Silicon Valley Artificial Intelligence Genomics Hackathon *Summer 2017*
The University of Chicago Paul C. Hodges Alumni Society Research Award *Autumn 2016*
Academic Excellence Scholarship *2010-2014*
Applied Mathematics, Engineering, and Physics Leadership Prize *Spring 2013*

Dr. Maritza Irene Stapanian Crabtree Physics Scholarship *Spring 2013*
Clarice Cox Mathematics and Physics Scholarship *Spring 2012*
Henry and Eleanor Firminhac Physics Scholarship *Spring 2012*

Skills

Programming Languages: Python, Matlab
Libraries and Frameworks: Keras, TensorFlow, Caffe, Scikit-Learn, Pandas, Jupyter, LaTeX

Activities

NIPS 2017
Machine Learning for Health Workshop Organizing Team ***2016-present***

- Coordinating fund raising efforts and handling sponsorship
- Recruiting invited speakers

The University of Chicago
Biological Sciences Division Dean's Council ***2015-present***

- Organizer and reviewer for the travel grant review process
- Medical physics student representative

Publications and presentations

Research Papers

N Antropova, M Giger, B Huynh, Hui Li, "Long short term memory networks for efficient breast DCE-MRI classification", *Medical Image Analysis*, (under review).
N Antropova, H Abe, M Giger, "Use of clinical MRI maximum intensity projections for improved breast lesion classification with deep CNNs." *NCI: Journal of the National Cancer Institute,* (under review).
N Antropova, B Huynh, M Giger, "A deep fusion methodology for breast cancer diagnosis demonstrated on three imaging modality datasets." *Medical Physics* (2017).
N Antropova, B Huynh, M Giger, "Multi-task Learning in the computerized diagnosis of Breast Cancer on DCE-MRIs." arXiv preprint arXiv:1701.03882 (2017).
H Li, B Huynh, M Giger, N Antropova, "Deep learning in breast cancer risk assessment: evaluation of convolutional neural networks on a large clinical dataset of FFDMs." *Journal of Med Imaging*, Aug (2017).
N Antropova, A Sanchez, I Reiser, E Sigky, J Boone, X Pan, "Efficient iterative image reconstruction algorithm for dedicated breast CT." In *SPIE Medical Imaging*. Int Society for Optics and Photonics, (2016).

Oral Presentations

N Antropova, B Huynh**,** M Giger, "Performance comparison of deep learning and segmentation-based radiomic methods in the task of distinguishing benign and malignant breast lesions on DCE-MRIs" *SPIE Medical Imaging: Physics of Medical Imaging* (2017).
N Antropova, B Huynh, M Giger, "Predicting breast cancer malignancy using pre-trained convolutional neural networks on DCE-MRI data" *American Association of Physicists in Medicine* (2016).
N Antropova, M Giger, H Li, K Drukker, L Lan, "Radiomics of breast cancer: A robustness study" *American Association of Physicists in Medicine* (2015).
H Li, B Huynh, M Giger, N Antropova, L Lan, "Use of deep learning in breast cancer risk assessment: evaluation of convolutional neural networks on a large clinical dataset of FFDMs" *Radiological Society of North America* (2016).

Poster Presentations

N Antropova, B Huynh, M Giger, "Multi-task learning in the computerized diagnosis of breast cancer on DCE-MRIs", *NIPS: Neural Information Processing Systems*, *Machine Learning in Health Care* (2016).
N Antropova, A Sanchez, I Reiser, E Sidky, j Boone, X Pan, "Efficient iterative reconstruction method for dedicated breast CT images", *SPIE Medical Imaging: Physics of Medical Imaging* (2015).
B Huynh, N Antropova, M Giger, "Comparison of breast DCE-MRI contrast time points for predicting response to neoadjuvant chemotherapy using deep convolutional neural network features with transfer learning," *SPIE Medical Imaging*, 2017 (2017).