

# Natalia (Natasha) Antropova

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The University of Chicago

## Education

**University of Chicago**

**2014 – present**

**Ph.D. in Medical Physics (3.92/4.0)**

**University of Wisconsin – Madison**

**2010 – 2014**

**Bachelor of Science in Applied Math, Electrical Engineering, and Physics (3.85/4.0)**

## Work and Research Experience

**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 DCE-MRIs, 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 heterogeneous data sources, small datasets, and patient-level inference.
- Published 5 conference submissions as first-author and co-authored 3 abstracts on topics ranging from deep learning in computer-aided diagnosis to statistical robustness studies of analytical image features.

**University of Chicago, Committee on Medical Physics**

**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 reconstruct 3D ultrasound images based on 2D scans and position of the probe attached to ultrasound transducer.

## Honors and Awards

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

**Preferred Languages:** Python, Matlab

**Libraries, Frameworks:** Caffe, Keras, TensorFlow, Scikit-Learn, Pandas

**Tools:** Jupyter, LaTeX

## Activities

### **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
- Organized a social event for Biological Sciences Division with about 300 students attending

## Publications and presentations

### **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* (February, 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* (July, 2016)

N Antropova, M Giger, H Li, K Drukker, L Lan, "Radiomics of Breast Cancer: A Robustness Study" *American Association of Physicists in Medicine* (July, 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* (November, 2016)

### **Poster Presentations**

N Antropova, B Huynh, M Giger, "Multi-task Learning in the Computerized Diagnosis of Breast Cancer on DCE-MRIs" *Neural Information Processing Systems, Machine Learning in Health Care* (December, 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* (February, 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 (February, 2017)

### **Research Papers**

N Antropova, B Huynh, H Li, H Abe, J Mueller, A Edwards, M Giger, "Assessment of deep convolutional neural networks and transfer learning in the diagnosis of breast lesions on a large clinical dataset of 640 DCE-MRIs", *Radiology* (under review)

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).

### **Proceeding Papers**

N Antropova, A Sanchez, I Reiser, E Sigky, J Boone, X Pan. (2016, March). "Efficient iterative image reconstruction algorithm for dedicated breast CT." In *SPIE Medical Imaging*. International Society for Optics and Photonics.

## Professional Associations

**American Association of Physicists in Medicine** - Member

**American College of Radiology** - Member