Qiyuan (Isabelle) Hu

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SUMMARY

- Medical imaging scientist with a focus on developing artificial intelligence methods for quantitative medical image analysis (diagnosis, prognosis, detection, segmentation, etc.) to improve healthcare quality
- Interdisciplinary collaborator working at the intersection of physics, medicine, computer science, and statistics
- Author of 3 publications in peer-reviewed journals and 4 conference proceeding papers

EDUCATION

University of Chicago Chicago, IL
PhD in Medical Physics, GPA: 3.97 / 4.0 Expected 2021

- Selected courses: Introduction to ML, Advanced ML and AI, ML and Cancer, Physics of Medical Imaging
- Awards: American Association of Physicists in Medicine Graduate Fellowship (awarded to one doctoral student each year); UChicago Center for Data and Computing Rising Stars in Data Science; 4 internal and external travel grants

Carleton College Northfield, MN
B.A., Physics, Mathematics, GPA: 3.97 / 4.0, summa cum laude with distinction in Physics Sep. 2013 – Jun. 2017

- Patricia V. Damon Merit Scholarship: awarded for a strong academic profile and extra-curricular accomplishment
- Dean's List in all academic years, Exemplary Writing Portfolio, Phi Beta Kappa First Year Prize

RESEARCH EXPERIENCE

University of Chicago, Committee on Medical Physics Chicago, IL
Doctoral Researcher, Advisor: Maryellen Giger, PhD Sep. 2017 – present
Topics: Artificial Intelligence for Medical Image Analysis for Breast Cancer Multiparametric MRI and COVID-19 Chest Radiography

- Develop novel computer vision methods using deep learning and human-engineered radiomic features for breast cancer diagnosis based on high-dimensional multiparametric MRI
- Collaborate with radiologist to visualize and interpret decisions of deep neural networks
- Investigate machine learning methods for COVID-19 diagnosis, prognosis, and treatment response
- Establish large-scale, open-source COVID-19 chest radiography and computed tomography database to contribute to the NIH-funded Medical Imaging and Data Resource Center

Mayo Clinic Graduate School, Department of Biomedical Engineering Rochester, MN
Summer Research Intern, Advisors: Lifeng Yu, PhD, Cynthia McCollough, PhD Jun. – Aug. 2016
Funded by Mayo Graduate School Summer Undergraduate Research Fellowship
Topics: Determining Human Observer Performance in Lung Cancer Screening CT

- Designed and conducted a virtual clinical trial for lung cancer screening CT using 12 conditions of nodule size, nodule type, acquisition dose level, and image reconstruction method
- Analyzed human observer performance which contributed to the development and validation of model observers and protocol optimization

MIT, Department of Electrical Engineering and Computer Science Cambridge, MA
Summer Research Intern, Advisor: Mildred Dresselhaus, PhD Jun. – Aug. 2015
Funded by Kolenkow Reitz Fund for Undergraduate Research
Topics: Raman Spectroscopy of Low-Dimensional Electrical Biased Device

- Designed and built an experimental set up and measured the Raman spectroscopy of graphene p-n junctions, which has potential applications in electronic devices
- Prepared ultrathin samples of GaTe, a novel 2-D material for electronic devices, to study its electrical properties

Carleton College, Department of Physics and Astronomy Northfield, MN
Independent Research Student and Summer Research Student, Advisor: Nelson Christensen, PhD 2014 – 2015
Topic: Schumann Resonance Measurement for noise analysis in LIGO's gravitational wave detection

- Designed and tested a circuit to collect Schumann resonance signals obtained from noncommercial antennas
- Measured Schumann resonance signals in outdoor low-noise environment to potentially subtract from signals detected by the LIGO gravitational-wave interferometers

SKILLS

Programming: Python, R, MATLAB, Java, Mathematica
Languages: English, Mandarin Chinese

PUBLICATIONS AND PRESENTATIONS

Journal Publications:

1. Hu Q, Whitney HM, Giger ML. "A deep learning methodology for improved breast cancer diagnosis using multiparametric MRI." *Scientific Reports* 10.1 (2020): 1-11.

2. Hu Q, Whitney HM, Giger ML. "Radiomics methodology for breast cancer diagnosis using multiparametric magnetic resonance imaging." *Journal of Medical Imaging* 7.4 (2020): 044502.

3. Gong H, Hu Q, Walther A, Koo CW, Takahashi EA, Levin DL, Johnson TF, Hora MJ, Leng S, Fletcher JG, McCollough CH. "Deep-learning-based model observer for a lung nodule detection task in computed tomography." *Journal of Medical Imaging* 7.4 (2020): 042807.

Select Proceeding Papers and Presentations (out of 10):

1. Hu Q, Drukker K, Giger ML. "Predicting the Need for Intensive Care for COVID-19 Patients using Deep Learning on Chest Radiography." Medical Imaging meets NeurIPS Workshop." (Extended Abstract. Poster presentation.)

2. Hu Q, Drukker K, Giger ML. "Role of standard and soft tissue chest radiography images in COVID-19 diagnosis using deep learning." *Medical Imaging 2021: Computer-Aided Diagnosis*. Vol. 11579. International Society for Optics and Photonics (SPIE), 2021. (Upcoming. Proceeding paper. Oral presentation.)

3. Hu Q, Papaioannou J, Whitney HM, Edwards A, Giger ML. "Comparative Radiomics Evaluation of Paired Conventional DCE-MRI and Abbreviated MRI for Breast Cancer Diagnosis." Radiological Society of North America (RSNA) Annual Meeting, 2020. (Scientific poster presentation.)

4. Hu Q, Whitney HM, Giger ML. "Transfer Learning in 4D for Breast Cancer Diagnosis using Dynamic Contrast-Enhanced Magnetic Resonance Imaging." *arXiv preprint arXiv:1911.03022* (2019). NeurIPS ML4H Workshop. (Extended Abstract. Poster presentation.)

5. Hu Q, Whitney HM, Edwards A, Papaioannou J, Giger ML. "TU-HI-SAN2-9: Multiparametric breast MRI radiomics in distinguishing between benign and malignant breast lesions." *Medical Physics* Vol. 46. No. 6., 2019. American Association of Physicists in Medicine (AAPM). (Selected oral presentation in the Science Council session. Highlighted as best of AAPM at American Society for Radiation Oncology [ASTRO] 2019 annual meeting.)

LEADERSHIP AND SERVICE

Society of Photo-Optical Instrumentation Engineers (SPIE) Student Chapter, University of Chicago
Vice President, 2019-2020; Treasurer and founding member, 2018

- Organized optics-related activities, such as outreach events, Fermi lab tour, guest speaker seminars, etc.

Mentoring and Teaching:

- Supervised 2 undergraduate summer research students
- Teaching assistant for 2 graduate courses: Physics of Radiation Therapy, Physics of Medical Imaging I Practicum
- Mentored first-year international graduate students in the Global Mentorship Network at University of Chicago

Outreach:

- Coached high school students in the Girls Who Code after-school program at Kenwood Academy
- Mentored high school students in the Women in STEM program at the University of Chicago Laboratory Schools

Review: Reviewer for journals including European Radiology, Journal of Medical Imaging, Journal of Magnetic Resonance Imaging, and IEEE Transactions on Biomedical Engineering, and conferences including NeurIPS ML4H.

Hackathon: Winner of MIT COVID-19 Challenge Hack4theFuture Hackathon, AI and the Future of Health track