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 4 publications in peer-reviewed journals and 10 conference presentations

EDUCATION

University of Chicago　　　　　　　　　　　　　　　　　　　　　　　　Chicago, IL
PhD in Medical Physics, GPA: 3.96 / 4.0　　　　　　　　　　　　　　　　　Expected 2021

- Selected coursework: Introduction to Machine Learning, Advanced Machine Learning and Artificial Intelligence, Machine Learning and Cancer, Physics of Medical Imaging, Physics of Radiation Therapy
- American Association of Physicists in Medicine Graduate Fellowship: awarded to one outstanding incoming doctoral student each year to support the first two years of graduate study
- Inaugural cohort of University of Chicago Center for Data and Computing Rising Stars in Data Science
- American Association of Physicists in Medicine Expanding Horizons Travel Grant
- Conference on Neural Information Processing Systems Machine Learning for Health Workshop Travel Grant Award
- Biological Sciences Division Travel Award
- Graduate Council Travel Fund Award

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
- Phi Beta Kappa honor society, Sigma Xi scientific research honor society

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
- Generated images under 12 conditions of nodule size, nodule type, acquisition dose level, and image reconstruction method using image processing techniques
- 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, Advisor: Martha-Elizabeth Baylor, PhD 2015 – 2017
Topic: Intensity Loss through Optical Waveguide in a Thiol-ele/methacrylate Photopolymer
- Produced thiol-ene/methacrylate photopolymer resin
- Experimentally determined the gel point and patterning cure point of the resin
- Made microfluidic device and investigated light attenuation through waveguides of various lengths

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, TensorFlow, R, MATLAB, Java, Mathematica
Languages: English, Mandarin Chinese

TEACHING AND MENTORING EXPERIENCE

University of Chicago, Committee on Medical Physics Chicago, IL
Teaching Assistant 2019 – 2020
- Held weekly discussion sessions, assisted in labs, and graded assignments for two courses: Physics of Radiation Therapy, Physics of Medical Imaging I Practicum

University of Chicago, Committee on Medical Physics Chicago, IL
Research mentor 2019 – 2020
- Supervised 2 undergraduate summer research students

Carleton College, Department of Mathematics Northfield, MN
Lab Assistant and Grader 2014 – 2017
- Assisted students with coding in RStudio, RMarkdown, and Mathematica for statistics and mathematics courses
- Graded assignments for courses including Multivariable Calculus, Linear Algebra, Ordinary Differential Equations, and Statistical Inference

LEADERSHIP EXPERIENCE 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.

Global Mentorship Network, University of Chicago Chicago, IL
Mentor 2019 – 2020
- Planned monthly events and maintained regular communication with mentees in the peer-mentor program that strives to connect international graduate students from all disciplines to foster a greater sense of community

MIT COVID-19 Challenge Hack4theFuture Hackathon
Winner in AI and the Future of Health track Nov. 2020

Review
- Journals: European Radiology, Journal of Medical Imaging, Journal of Magnetic Resonance Imaging, and IEEE Transactions on Biomedical Engineering
- Conferences: Neural Information Processing Systems Conference Machine Learning for Health Workshop

Graduate Council Travel Fund Committee, University of Chicago Chicago, IL
Member 2019

- Served on the review board of the graduate council travel fund, which provides funds for graduate students to attend academic conferences, networking events, and other venues.

Committee on Medical Physics Retreat Committee, University of Chicago — Chicago, IL
Member — 2019

Women in Math and Sciences (WhiMS), Carleton College — Northfield, MN
Peer mentor — 2015 – 2017

OUTREACH AND VOLUNTEERING EXPERIENCE

Women in STEM Club, University of Chicago Laboratory High School — Chicago, IL
Mentor — 2019 – 2020
- Attend quarterly events to discuss experience as women in STEM and provide guidance for high school students navigating their way in the field.
- Mentor a student matched based on similar academic interests through regular meetings and communication by advising her on course choices summer internship opportunities, sharing college experiences, and exploring future career options in STEM.

Girls Who Code, Toyota Technological Institute at Chicago — Chicago, IL
Volunteer facilitator — 2019 – 2020
- Coached high school students in the GWC after-school program to study computer science through online coding tutorials and build projects that solve real-world problems

American Cancer Society Walk and Roll — Chicago, IL
Volunteer — Jun. 2019

Slow Food Chicago — Chicago, IL
Volunteer — 2019
- Helped revitalize a Chicago West Side neighborhood through community gardening
- Promoted sustainable foods and local culinary cultures as an alternative to fast food and agriculture globalization

Science Olympiad — Chicago, IL
Volunteer — Feb. 2019

INTERNSHIPS

Medtronic (Shanghai) Management Co., Inc. — Beijing, China
Marketing Intern — Dec. 2015
- Analyzed global cardiac rhythm heart failure market research reports and data from local market research on implantable loop recorders
- Helped organize the 2016 China International Pacemaker Conference and the 8th annual China Pacemaker Summit

IBM Global Business Services — Beijing, China
Business Analysis Intern — Dec. 2014
- Worked on online banking development and maintenance for the Bank of China

PUBLICATIONS AND PRESENTATIONS

Journal Publications:
1. Hu Q, Whitney HM, Li H, Yu J, Liu P, Giger ML. "Improved classification of benign and malignant breast lesions using deep feature maximum." *Radiology: Artificial Intelligence.* (In press)

2. 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.

3. 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.

4. Gong H, <u>Hu Q</u>, 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.

Proceeding Papers and Presentations:

1. <u>Hu Q</u>, 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. (Proceeding paper. Oral presentation. Runner-up of the Computer-Aided Diagnosis Paper Award. Runner-up of the Robert F. Wagner All-Conference Best Student Paper award.)

2. Bhattacharjee R, Douglas L, Drukker K, <u>Hu Q</u>, Fuhrman J, Sheth D, Giger ML. "Comparison of 2D and 3D U-Net breast lesion segmentations on DCE-MRI." *Medical Imaging 2021: Computer-Aided Diagnosis.* Vol. 11579. International Society for Optics and Photonics (SPIE), 2021. (Proceeding paper. Oral presentation by Bhattacharjee R.)

3. <u>Hu Q</u>, Drukker K, Giger ML. "Predicting the Need for Intensive Care for COVID-19 Patients using Deep Learning on Chest Radiography." The 34th Neural Information Processing Systems Conference (NeurIPS) Medical Imaging meets NeurIPS Workshop. (Extended Abstract. Poster presentation.)

4. <u>Hu Q</u>, 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.)

5. <u>Hu Q</u>, Whitney HM, Giger ML. "Using ResNet feature extraction in computer-aided diagnosis of breast cancer on 927 lesions imaged with multiparametric MRI." *Medical Imaging 2020: Computer-Aided Diagnosis.* Vol. 11314. International Society for Optics and Photonics (SPIE), 2020. (Proceeding paper. Oral presentation.)

6. <u>Hu Q</u>, 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). The 33rd Neural Information Processing Systems Conference (NeurIPS) Machine Learning for Health Workshop (ML4H). Extended Abstract. Poster presentation.)

7. <u>Hu Q</u>, 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.)

8. <u>Hu Q</u>, Whitney HM, Edwards A, Papaioannou J, Giger ML. "Radiomics and deep learning of diffusion-weighted MRI in the diagnosis of breast cancer." *Medical Imaging 2019: Computer-Aided Diagnosis.* Vol. 10950. International Society for Optics and Photonics (SPIE), 2019. (Proceeding paper. Poster presentation.)

9. Gong H, Walther A, <u>Hu Q</u>, Koo CW, Takahashi EA, Levin DL, Johnson TF, Hora MJ, Leng S, Fletcher JG, McCollough CH. "Correlation between a deep-learning-based model observer and human observer for a realistic lung nodule localization task in chest CT." *Medical Imaging 2019: Image Perception, Observer Performance, and Technology Assessment.* Vol. 10952. International Society for Optics and Photonics (SPIE), 2019. (Proceeding paper. Oral presentation given by Gong H.)

10. Yu L, <u>Hu Q</u>, Koo CW, Takahashi EA, Levin DL, Johnson TF, Hora MJ, Dirks S, Chen B, McMillan K, Leng S, Fletcher JG, McCollough CH. "A virtual clinical trial using projection-based nodule insertion to determine radiologist reader performance in lung cancer screening CT." *Medical Imaging 2017: Physics of Medical Imaging.* Vol. 10132. International Society for Optics and Photonics (SPIE), 2017. (Proceeding paper. Oral presentation given by Yu L.)