

# Maxwell A. Xu

[maxxu05.github.io](https://maxxu05.github.io)

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## EDUCATION

### Georgia Institute of Technology

*PhD in Machine Learning*

*M.S. in Computer Science*

2020 – Current

GPA: 4.00 / 4.00

### Johns Hopkins University

*B.S. in Applied Math & Statistics*

*B.S. in Biomedical Engineering*

Graduated 2019

GPA: 3.84 / 4.00

## SKILLS

**Programming:** Python, R, Java, SQL, MATLAB

**Machine Learning:** Time Series, Self-Supervised Learning, Contrastive Learning, Transformers, Physiological Sensors

**Clearance:** United States Top Secret [Expired]

## AWARDS

\* National Science Foundation Graduate Research Fellowship

\* Georgia Tech Presidential Fellowship

\* Intuitive Surgical Best Deep Learning Project Award

\* 1st Place Johns Hopkins FFU Spark Accelerator Competition

## EXPERIENCE

### Rehg Lab at Georgia Tech

PhD Student / Graduate Research Assistant

Atlanta, GA

Aug 2020 – Current

- Research interests include developing self-supervised learning methods for time-series using transformers with applications in healthcare and to physiological sensors
- Projects include designing a novel SOTA time-series contrastive learning method with conditional reconstruction accuracy to identify positive/negative pairs, pulsative physiological signal imputation with transformers, and disease progression modeling with ct-hmm's
- First author published in NeurIPS, INSAR

### Systems & Technology Research

Machine Learning Researcher

Boston, MA

Jan 2020 – Aug 2020

- Conducted machine learning research for identifying vulnerabilities in speech-processing programs with reinforcement learning and representation learning techniques
- Worked on frontend UI and backend data retrieval, visualization, and unit testing

### Medtronic plc

Data Science Engineer Contractor

New Haven, CT

May 2019 – Dec 2019

- Predict lung cancer recurrence from tabular clinical data
- Utilized survival analysis with Kaplan-Meier curve visualizations to identify cancer recurrence risk factors

### BioSwift Biomedical Engineering Design Team

Former Chief Executive Officer and Co-Founder

Baltimore, MD

Aug 2018 – Dec 2019

- Designed inhaler attachment to assist pediatric asthmatic patients
- Won 1<sup>st</sup> place in the 2019 ASAIOfyi Student Design Competition, 1<sup>st</sup> place at Fall 2019 Johns Hopkins FastForward U Spark Accelerator Competition, 3<sup>rd</sup> place at 2019 Johns Hopkins BPC
- Secured over \$10,000 in funding, including from the Johns Hopkins Student Initiatives Fund

## PUBLICATIONS

**Xu, M.**, Moreno, A., Wei, H., Marlin, B., & Reh, J. M. (2023). Retrieval-Based Reconstruction For Time-series Contrastive Learning. In Review for ICLR 2024. <https://arxiv.org/abs/2311.00519>

**Xu, M.**, Moreno, A., Nagesh, S., Aydemir, V., Wetter, D., Kumar, S., & Reh, J. M. (2022). PulseImpute: A Novel Benchmark Task for Pulsative Physiological Signal Imputation. *Advances in Neural Information Processing Systems*, 35, 26874-26888.

**Xu, M.**, Reh, J., Rozga, A., McDaniel, J., Yoder, P., Watson, L., & Brady, N. (2022). Discovering Novel Predictors of Minimally Verbal Outcomes in Autism through Computational Modeling. *International Society for Autism Research (Oral + Press Conference < 1% acceptance rate) Press release*: <https://twitter.com/AutismINSAR/status/1524427451069345825>

Liu, Y., Moreno, A.<sup>†</sup>, **Xu, M.**<sup>†</sup>, Li, S., McDaniel, J., Brady, N., Rozga, A., Li, F., Song, L., Reh, J. Efficient Learning and Decoding of the Continuous-Time Hidden Markov Model for Disease Progression Modeling. *arXiv [cs.LG]*. 2021 Retrieved From <http://arxiv.org/abs/2110.13998> (<sup>†</sup>Co-second authors)



- Pomeranz Krummel, D., Nasti T., Kaluzova, M., Kallay, L., Melms, J., Izar, B., **Xu, M.**, Bhattacharya, D., Burnham, A., Ahmed, T., Li, G., Lawson, D., Kowalski, J., Cook, J., Medvedovic, M., Jenkins, A., Khan, M., Sengupta, S. Melanoma cell intrinsic GABAA receptor enhancement potentiates radiation and immune checkpoint inhibitor response by promoting direct and T cell-mediated anti-tumor activity. *International Journal of Radiation Oncology*. 2020. DOI: <https://doi.org/10.1016/j.ijrobp.2020.10.025>
- Pomeranz Krummel, D.<sup>‡</sup>, Nasti, T.<sup>‡</sup>, Izar, B.<sup>†</sup>, Press, R.<sup>†</sup>, **Xu, M.**<sup>†</sup>, Lowder, L., Kaluzova, M., Kallay, L., Rupji, M., Rosen, H., Su, J., Curran, W., Olson, J., Weinberg, B., Schniederjan, M., Neill, S., Lawson, D., Kowalski, J., Khan, M., Sengupta, S. Impact of sequencing radiation therapy and immune checkpoint inhibitors in the treatment of melanoma brain metastases. *Radiation Oncology*. 2020. DOI: <https://doi.org/10.1016/j.ijrobp.2020.01.043> (‡Co-first authors; †Co-second authors)
- Kallay, L., Keskin, H., Ross, A., Rupji, M., Moody, O., Wang, X., Li, G., Ahmed, T., Rashid, F., Rajesh Stephen, M., Cottrill, K., Nuckols, T., **Xu, M.**, Martinson, D., Tranchese, F., Pei, Y., Cook, J., Kowalski, J., Taylor, M., Jenkins, A., Pomeranz Krummel, D., Sengupta, S. Modulating native GABAA receptors in medulloblastoma with positive allosteric benzodiazepine-derivatives induces cell death. *Journal of Neuro-Oncology*. 2019; 142(3):411-422. doi: 10.1007/s11060-019-03115-0
- Pomeranz Krummel, D.<sup>‡</sup>, Tahseen, N.<sup>‡</sup>, Izar, B.<sup>†</sup>, **Xu, M.**<sup>†</sup>, Lowder, L., Press, R., Rupji, M., Kaluzova, M., Kallay, L., Burnham, A., Li, G., Ahmed, T., Chen, H., Curran, W., Kudchadkar, R., Olson, J., Schniederjan, M., Neill, S., Lawson, D., Cook, J., Weinberg, B., Jenkins, A., Kowalski, J., Khan, M., Sengupta, S. EXTH-12. Radiation enhances melanoma response to immunotherapy and synergizes with benzodiazepines to promote anti-tumor activity. *Neuro-Oncology*, 21(Supplement 6), November 2019, Page vi84, <https://doi.org/10.1093/neuonc/noz175.346> (‡Co-first authors; †Co-second authors)
- Kaluzova, M., Nasti, T., Chen, H-R., Lowder, L., Press, R., Rosen, H., Rupji, M., Kallay, L., Patel, R., Burnham, A., **Xu, M.**, Ross, A., Keskin, H., Connelly, E., Izar, B., Adamson, C., Olson, J., Su, J., Curran, W., Kudchadkar, R., Schniederjan, M., Neill, S., Lawson, D., Chan, M., Kowalski, J., Khan, M., Pomeranz Krummel, D., Sengupta, S. Abstract 247: Identification of the GABAA receptor in melanoma brain metastases patient tumors and demonstration that it is a viable drug target using benzodiazepine-derivatives. In: *Proceedings of the American Association for Cancer Research Annual Meeting 2019*; 2019 Mar 29-Apr 3; Atlanta, GA. Philadelphia (PA): AACR; *Cancer Res* 2019;79(13 Suppl). <https://doi.org/10.1158/1538-7445.AM2019-247>
- Kallay, L., Keskin, H., Ross, A., Rupji, M., Moody, O., Wang, X., Li, G., Ahmed, T., Rashid, F., Rajesh Stephen, M., Cottrill, K., Nuckols, A., **Xu, M.**, Martinson, D., Tranchese, F., Pei, Y., Cook, J., Kowalski, J., Taylor, M., Jenkins, A., Pomeranz Krummel, D., Sengupta, S. Abstract 2623: Modulating native GABAA receptors in medulloblastoma with positive allosteric benzodiazepine-derivatives induces cell death. *Proceedings of the American Association for Cancer Research Annual Meeting 2019*; 2019 Mar 29-Apr 3; Atlanta, GA. Philadelphia (PA): AACR; *Cancer Res* 2019;79(13 Suppl). <https://doi.org/10.1158/1538-7445.AM2019-2623>
- Kowalski, J., Pomeranz Krummel, D., Rupji, M., Dwivedi, B., Keskin, H., Kallay, K., **Xu, M.**, Ross, A., Press, R., Rosen, H., Connelly, E., Patel, R., Izar, B., Adamson, C., Olson, J., Su, J., Kudchadkar, R., Schniederjan, M., Lowder, L., Neill, S., Curran, W., Lawson, D., Chan, M., Khan, M., Sengupta, S. COMP-22: Large scale transcriptomic analysis of melanoma brain metastases, *Neuro-Oncology*, Volume 20, Issue suppl\_6, 1 November 2018, Page vi68, <https://doi.org/10.1093/neuonc/noy148.277>
- Kowalski, J., Pomeranz Krummel, D., Rupji, M., Dwivedi, B., Keskin, H., Kallay, K., **Xu, M.**, Ross, A., Press, R., Rosen, H., Connelly, E., Patel, R., Izar, B., Adamson, C., Olson, J., Su, J., Kudchadkar, R., Schniederjan, M., Lowder, L., Neill, S., Curran, W., Lawson, D., Chan, M., Khan, M., Sengupta, S. CD131: Large scale transcriptomic analysis of melanoma brain metastases. *Annals of Neurology* 84(suppl 22), 2018.
- Kallay, L., Keskin, H., Ross, A., Moody, O., Cottrill, K., Nuckols, A., Li, G., Ahmed, T., Rashid, F., Rajesh Stephen, M., **Xu, M.**, Martinson, D., Macdonald, T., Kowalski, J., Wang, X., Taylor, M., Cook, J., Jenkins, A., Pomeranz Krummel, D., Sengupta, S. PDTM-45: Positive modulation of native gabaa receptors in medulloblastoma cancer cells with benzodiazepines induces rapid mitochondrial fragmentation and tp53-dependent, cell cycle-independent apoptosis. *Neuro-Oncology*, Volume 20, Issue suppl\_6, 1 November 2018, Page vi213, <https://doi.org/10.1093/neuonc/noy148.884>

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## PERSONAL PROJECTS

### **Modeling A Transferable Histopathological Image Analysis System**

Dec 2019

- Developed a deep clustering representation learning method for histopathology images
- Won Intuitive Surgical Best Deep Learning Project Award (\$800 cash prize)
- Press Release:
  - <https://www.cs.jhu.edu/2020/01/28/deep-learning-course-prepares-students-for-success-in-ai-careers/>