DIEGO MACHADO REYES

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EDUCATION

Ph.D. Biomedical Engineering   Aug 2020 – May 2025
Rensselaer Polytechnic Institute, Troy, NY

B.S. Biomedical Engineering Emphasis in Bioinformatics   Aug 2016 – May 2020
The University of Mississippi, University, MS
Latin Honors and Awards: Magna Cum Laude, Dean's Excellence Award.
Sally Barksdale Honors College: Honors Scholar in Biomedical Engineering

EXPERIENCE

IBM Research Intern
IBM, Yorktown Heights, NY   May 2023 – Aug 2023

- Developed a multi-modal foundation model for multi-omics association (genotype-brain imaging phenotype).
- Methods: self-supervised learning, transformers, representation learning.
- Technical lead and team development of code with 2 other IBM full time researchers.
- Wrote technical descriptions, and innovations claims for patent filling.

IBM Research Intern   May 2022 – Aug 2022

- Developed a framework for fairness in polygenic risk scores for underrepresented populations.
- Methods: Invariant risk minimization, domain generalization, robustness.
- Podium talk and paper published in conference proceedings at the Pacific Symposium of Biocomputing.

NIA Alzheimer's Disease Clinical and Translational Research Training Program Fellow   Aug 2021 – *Present*
Rensselaer Polytechnic Institute, Troy, NY
Multimodal agentic AI for disease diagnosis

- Developed a multimodal generative AI model for disease diagnosis using clinical report, genomics, and MRI.
- Achieved interpretable early subtyping of Parkinson's disease without retraining using large language models.
- Initial results are under revision at MICCAI.

Parkinson's disease (PD) patient screening from health questionnaires.

- Developed AI model for PD screening from patient reported outcomes.
- Solved technical challenges of 1) Data sparsity 2) Generalizability 3) Interpretability.
- Leveraged large language models for data encoding. Work under second round of revision at Nature Aging.

Multimodal biomedical data fusion and disease biomarker discovery

- Developed attention-based deep learning models for efficient genotype, brain imaging, and clinical-tabular data encoding towards patient classification and imaging-genomics feature association.
- Key focus on interpretability, and generalizability in medical AI.
- Published in Journal of Precision Medicine and as full conference proceedings at ACM-BCB and BHI conferences.

Multimodal COVID-19 outcome classification

- Implemented and benchmarked machine learning techniques, such as support vector machine, random forest and logistic regression, for COVID-19 patient outcome classification.

RELEVANT SKILLS

- **Coding languages and libraries:** Python, R, MATLAB, Pytorch, Tensorflow/Keras, Scikit-learn, Seaborn, Statsmodels, PLINK, Git, Conda environments, Shell , Slurm.
- **Techniques:** Data visualization, medical imaging analysis, genetic sequencing analysis, omic data analysis.
- **AI methods:** Supervised and self-supervised training, large language models (LLM), vision language models (VLM), representation learning, multimodal data fusion, self- and cross-attention mechanisms, generative AI.
- **Soft skills:** Team management, effective communication, public speaking, leadership, strategic planning, fundraising, customer relations, event planning.
- **Languages:** Spanish – Native, English – bilingual proficiency, German - Limited proficiency

SELECTED PUBLICATIONS
1. **Machado Reyes, D.** et al. A Multimodal Foundation Model for Discovering Genetic Associations with Brain Imaging Phenotypes. (Under revision, ISMB, 2024). medRxiv 2024–11 Preprint at doi.org/10.1101/2024.11.02.24316653
2. **Machado Reyes, D** et al.: Language Modeling Screens Parkinson's Disease with Self-reported Questionnaires. (Under Review, Nature Aging, 2024). medRxiv 2024–09 Preprint at doi.org/10.1101/2024.09.23.24314200
3. **Machado Reyes, D.** et al.: Identifying Progression-Specific Alzheimer's Subtypes Using Multimodal Transformer. Journal of Precision Medicine. 14, 421 (2024). doi:10.3390/jpm14040421
4. **Machado-Reyes, D.**, et al. Connectome transformer with anatomically inspired attention for Parkinson's diagnosis. in Proceedings of the 13th ACM International Conference on Bioinformatics, Computational Biology and Health Informatics 1–4 (ACM, 2022). doi:10.1145/3535508.3545544
   Full list found on Google Scholar: https://scholar.google.com.mx/citations?user=wBUzQaEAAAAJ

SELECTED CONFERENCE PRESENTATIONS
1. Quest2Dx: Questionnaire Transformers for Parkinson's Disease Screening. *Annual meeting of the Biomedical Engineering Society (BMES).* Baltimore, MD. October 2024.
2. FairPRS: adjusting for admixed populations in polygenic risk scores using invariant risk minimization. *Pacific Symposium of Biocomputing.* Waimea, HI. January 2023
3. Connectome transformer with anatomically inspired attention for Parkinson's diagnosis. *ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM BCB).* Chicago, IL. August 2022.

AWARDS AND SCHOLARSHIPS
Founders award   October 2024
Rensselaer Polytechnic Institute, Troy, NY
Awarded to the Top 1% of the student body.

Dean's Excellence Award   May 2020
The University of Mississippi, University, MS
Awarded to top graduating students from the School of Engineering.

NIA Alzheimer's Disease Clinical and Translational Research Training Program Fellowship   Aug 2021 – Present
Rensselaer Polytechnic Institute, Troy, NY
International Academic Excellence Scholarship (AES-INTL)   Aug 2016 – May 2020
The University of Mississippi, University, MS

SELECTED VOLUNTEER EXPERIENCE AND EXTRACURRICULAR ACTIVITIES

Chief Scientific Officer   Aug 2023 – December 2024
AduCare (Startup)
- Developed a predictive framework for Alzheimer's patient management and disease progression tracking.
- Conducted customer discovery interviews to refine product-market fit.
- Completed the New York State I-Corps entrepreneurial training program.

Program Chair   Jan 2024 – July 2024
Student Council Symposium – ISMB 2024
- Lead program committee to successfully review abstract submissions and organize program.
- Invited keynote speakers and coordinated their participation.

President   Aug 2023 – Present
CBIS Graduate and Postdoctoral Student Association.
- Organized resume and job search workshops for graduate students.
- Collaborated with the career center and admin to host research networking events.
- Created events that fostered a vibrant and collaborative community.
- Prepared and managed an annual budget of $3500.
- Designed strategic planning for 1-year plan and 5-year plan