Ramon Luis Correa-Medero

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Education

Arizona State University 2021-Current
Ph.D student in Data Science, Analytics, and Engineering
Topic: AI Fairness and Domain Generalization

Emory University[Transfered] 2019-Transfer
Ph.D student in Computer Science

Case Westeen Reserve University 2014-2019
B.S Biomedical Engineering Minor Computer Science

Research Experience

Causal learning mitigate hidden biases in Vision Language Models A3I Hub@**Mayo Clinic** 2023-Ongoing

- Implemented causal methods to estimate unknown confounding in screening mammogram populations. Allowing adaptation of VLM model to reduce biases in downstream applications.
- Reduced hospital-level disparities in recurrence prediction from histopathology images by using causality-inspired techniques to train models using features from VLMs.
- Improved performance on external data, increasing C-Index from 0.6 to 0.7.

Domain Generalization Improves Characterization of Kidney Health A3I Hub@**Mayo Clinic** Aug 2021-Ongoing

- Developed novel domain adaptation technique to improve robustness of segmentation models robustness to variation in organ appearance caused by disease.
- Leveraged Google Vertex AI, Big Query, and Google Cloud Health API to curate datasets and train and evaluate imaging-based models to estimate differential kidney function.
- Improved segmentation performance on unseen contrast phases by 10%.

Constrained Adversarial Learning produces Fair and Effective Medical AI A3I Hub@**Mayo Clinic** 2021-2023

- Implemented novel debiasing techniques utilizing interpretability techniques and adversarial learning to reduce model disparities across use cases in screening mammography, chest x-ray disease, and skin lesion classification.
- Model performance on external datasets obtained a 20% increase compared to baseline models.

Virtual Biopsy of Brain Tumors using AI and radiomics BRIC Lab@**CWRU** Summer 2016-Spring 2019

- Applied segmentation models to extract radiomic features to non-invasively derive insights from the tumor micro-environment using imaging.
- Built models to predict treatment response and estimate the risk of tumor recurrence from routine MRI for brain cancer patients.

Work Experience

MD.AI: Research Engineering Intern May 2022-Aug 2022

- Improved MRI-based model robustness to distribution shifts by applying data harmonization techniques.
- Increased the reliability of PHI detection on x-ray scans by augmenting model training.

Alphacore: AI Engineer (Consultant) January 2024-July 2024

- Reduced data storage needs by developing an autoencoder model to compress time series geo-sensor measurements.
- Developed autoencoder inspired by Meta's encodec model to compress sensor data by incorporating custom frequency and adversarial losses.

Skills and Tools

- **Programming Languages:** Python, Java, Matlab, & Bash
- **Libraries**: Pytorch, Tensorflow, Pandas, Numpy, & Scikit-learn
- **Tools:** Docker, BigQuery, & Git
- **Platforms:** Google Vertex AI & Linux

Services

- **Reviewer: The Visual Computer Journal, Nature Scientific Reports**

Conference Papers

1. **Correa, R.** *Comparative analysis of multiphase CT volumetric kidney segmentation: fine-tuning to domain adaptation* in *Medical Imaging 2024: Computer-Aided Diagnosis* (eds Astley, S. M. & Chen, W.) (SPIE, San Diego, United States, Apr. 2024), 123. ISBN: 978-1-5106-7159-1.
2. **Correa, R.** *A robust two-step adversarial debiasing with partial learning - medical image case-studies* in *SPIE Medical Imaging 2023: Computer-Aided Diagnosis* (2023).
3. **Correa, R. L.,** Patel, B., Banerjee, I., *Adversarial Debiasing techniques towards 'fair' skin lesion classification* in *2023 11th International IEEE/EMBS Conference on Neural Engineering (NER)* (2023), 1–4.
4. **Correa, R.** *Lesion-habitat radiomics to distinguish radiation necrosis from tumor recurrence on post-treatment MRI in metastatic brain tumors* in *SPIE Medical Imaging 2020: Computer-Aided Diagnosis* **11314** (2020), 1131430.

Journal Articles

5. **Correa, R.,** Jeong, J., Patel, B., Banerjee, I., Abdul-Muhsin, H., Automated Analysis of Split Kidney Function from CT Scans Using Deep Learning and Delta Radiomics. *Journal of endourology,* 2 (May 2024).
6. **Correa, R.** Efficient adversarial debiasing with concept activation vector — Medical image case-studies. *Journal of Biomedical Informatics* **149,** 104548. ISSN: 15320464 (Jan. 2024).
7. **Correa-Medero**, R. L. Causal Debiasing for Unknown Bias in Histopathology - A Colon Cancer Use Case. *Plos One(Accepted)* (2024).
8. Jeong, J. The EMory BrEast imaging Dataset (EMBED): A Racially Diverse, Granular Dataset of 3.4 Million Screening and Diagnostic Mammographic Images. English (US). *Radiology: Artificial Intelligence* **5.** Publisher Copyright: © 2023 Radiological Society of North America. ISSN: 2638-6100 (Jan. 2023).
9. **Correa, R.** A Systematic Review of 'Fair' AI Model Development for Image Classification and Prediction. en. *Journal of Medical and Biological Engineering* **42,** 816–827. ISSN: 2199-4757 (Dec. 2022).
10. Gichoya, J. W. AI recognition of patient race in medical imaging: a modelling study. *The Lancet Digital Health* **4,** e406–e414. ISSN: 2589-7500 (2022).

Workshops

11. **Correa, R.** *Domain adaptation for contrast-agnostic CT volumetric kidney segmentation* in *LatinX in AI (LXAI) Research at ICML 2024* (2024).
12. **Correa, R.** *Two-step adversarial debiasing with partial learning – medical image case-studies* in *AAAI 2022:Trustworthy AI Workshop* (2022).