ANTHONY ORTIZ

E-mail: anthony.ortiz@microsoft.com
Website: https://www.microsoft.com/en-us/research/people/anort

Bio

I am a senior applied and research scientist at Microsoft. I work in the Microsoft AI for Good research lab.

My work focuses on tackling large scale problems at the intersection machine learning and computer vision and its application to remote sensing, geospatial analytics, and medical imaging. Some of the projects I work on include: the development of TorchGeo which is a PyTorch domain library, similar to Torchvision, that provides datasets, transforms, samplers, and pre-trained models specific to geospatial data.Applied projects including detecting and outlining glaciers, detecting solar farms and windmills installations across continental India, and detecting tumors from positron emission tomography (PET) imagery, semantic segmentation of Computer Tomography (CT) volumes. I also work on fundamental research in generalization, transfer learning, conditional computation, and domain adaptation.

EDUCATION

University of Texas at El Paso, Computer Science Dept., El Paso, TX, USA
Ph.D. in Computer Science

- Dissertation: Deep learning for Overhead Imagery: Algorithms and Applications.
- Advisor: Olac Fuentes. Co-Advisor: Christopher Kiekintveld
- Dissertation Committee: Olac Fuentes, Christopher Kiekintveld, Miguel Velez-Reyes, Nebojsa Jojic, Yoshua Bengio

University of Texas at El Paso, Computer Science Dept., El Paso, TX, USA
Master's Degree, **Computer Science**

- Advisor: Olac Fuentes

Pontificia Universidad Catolica Madre y Maestra, Santiago, D.R.
Bachelor of Science, **Electrical and Computer Engineering**, 2014

- Summa Cum Laude (Top 1%)

EXPERIENCE

Microsoft AI for Good Research Lab, Redmond, WA, USA
Senior Applied and Research Scientist **June 2020 - present**

- Work with external collaborators from different research institutions including University of British Columbia (UBC), University of Washington (UW), John Hopkins University, and Harvard University on medical imaging related projects
- Work with external collaborators including The Nature of Conservancy (TNC), the Smithsonian Institution, NOAA, and the World Bank on geospatial machine learning projects
- More than ten papers accepted in top conferences and journals including ECCV, CVPR, ICLR, NeurIPS, IGARSS, Nature Scientific Report, Journal of Nuclear Medicine, Nature Scientific Data.

Orbital Insight, Palo Alto, CA, USA
Computer Vision Intern **June 2019 - August 2019**

- Successfully generated synthetic satellite image from semantic labels and metadata encoding using a variant Generative Adversarial Networks (GAN). Patent being filled.

Microsoft Research, Redmond, WA, USA
AI Research Intern **March 2019 - June 2019**

- Advisors: Nebojsa Jojic, Dan Morris
- Research on machine learning, deep learning, and human-machine collaboration for efficient land cover mapping. Also worked closely with Microsoft AI for Earth using artificial intelligence to support NGOs. 2 papers accepted to AAAI 2020 and CVPR 2020.

Quebec Artificial Intelligence Institute (Mila), Montreal, QC, Canada
Visiting Researcher **September 2018 - March 2019**

- Advisor: Yoshua Bengio
- Research on deep learning for remote sensing. I am studying models generalization, spectral-spatial compositionality, and multiview image-based superresolution for satellite images. Started a collaboration effort between Intel AI, The American Red Cross, and Mila to map Uganda and support the Red Cross on disaster response.

University of Texas at El Paso, Intelligent Agents and Strategic Reasoning Laboratory (IASRL), El Paso, TX
Research Assistant **August 2017 - Present**

- Developed a deep learning architecture which jointly integrates learning and band subset selection for multispectral and hyperspectral imagery improving segmentation performance by more than 12%. Developed attacks and defenses against non-RGB image-based machine learning systems. Proposed a novel defense to increase robustness on non-RGB image-based classifiers while improving performance.

US Army Research Laboratory (ARL - West) & USC-ICT, Playa Vista, CA
Visiting Research Assistant **Summer 2017**

- Research in machine learning with state estimation and sensor modeling, deep learning, computer vision, and remote sensing. Papers accepted to SPIE DCS and IEEE WHISPERS.

US Army Research Laboratory (ARL - West) & USC-ICT, Playa Vista, CA
Visiting Research Assistant **Summer 2016**

- Research in the areas of computer vision, hyperspectral image processing and remote sensing. We solved the problem of automatically fusing hyperspectral data of a digitized scene with image-based 3D models, overlapping the same scene, in order to associate material spectra with corresponding height information for improved scene understanding. Conference paper accepted for oral presentation (IGARSS 2017)

SELECTED PUBLICATIONS

[1] Stewart, Adam J., Caleb Robinson, Isaac A. Corley, **Anthony Ortiz**, Juan M.

Lavista Ferres, and Arindam Banerjee. "TorchGeo: deep learning with geospatial data." Under submission, ICLR 2022.

[2] N. Jojic, N. Malkin, C. Robinson and **A. Ortiz**, "From Local Algorithms to Global Results: Human-Machine Collaboration for Robust Analysis of Geographically Diverse Imagery," 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, 2021, pp. 270-273, doi: 10.1109/IGARSS47720.2021.9554869.

[3] Caleb Robinson, **Anthony Ortiz**, Lacey Hughey, Jared A. Stabach, and Juan M. Lavista Ferres. "Detecting Cattle and Elk in the Wild from Space." arXiv preprint arXiv:2106.15448 (2021).

[4] Ivan Klyuzhin, Yixi Xu, Sara Harsini, **Anthony Ortiz**, Carlos Uribe, Juan Lavista Ferres, and Arman Rahmim. "Unsupervised background removal by dual-modality PET/CT guidance: application to PSMA imaging of metastases." Journal of Nuclear Medicine (2021): 36-36.

[5] Kshirsagar, M., Robinson, C., Yang, S., Gholami, S., Klyuzhin, I., Mukherjee, S., Nasir, M., **Ortiz, A.**, Oviedo, F., Tanner, D. and Trivedi, A., Becoming Good at AI for Good. AIES 2021

[6] Robinson, Caleb, **Anthony Ortiz**, Juan M. Lavista Ferres, Brandon Anderson, and Daniel E. Ho. "Temporal Cluster Matching for Change Detection of Structures from Satellite Imagery." arXiv preprint arXiv:2103.09787 (2021).

[7] Rajotte, Jean-Francois, Sumit Mukherjee, Caleb Robinson, **Anthony Ortiz**, Christopher West, Juan Lavista Ferres, and Raymond T. Ng. "Reducing bias and increasing utility by federated generative modeling of medical images using a centralized adversary." arXiv preprint arXiv:2101.07235 (2021).

[8] Robinson, C., Trivedi, A., Blazes, M., **Ortiz, A**., Desbiens, J., Gupta, S., Dodhia, R., Bhatraju, P.K., Liles, W.C., Lee, A. and Kalpathy-Cramer, J., 2021. Deep learning models for COVID-19 chest x-ray classification: Preventing shortcut learning using feature disentanglement. Under submission on PlOS 2021.

[9] **Anthony Ortiz**, Anusua Trivedi, Jocelyn Desbiens, Caleb Robinson, Marian Blazes, Sunil Gupta, Rahul Dodhia et al. "Effective Deep Learning Approaches for Predicting COVID-19 Outcomes from Chest Computed Tomography Volumes." Nature Scientific Reports (2021).

[10] Ferres, Juan Lavista, Caleb Robinson, Siyu Yang, **Anthony Ortiz**, M. D. Nasir, Yixi Yu, and Anusua Trivedi. "Lessons learned from our investments in AI For Good at Microsoft." In AGU Fall Meeting 2020. AGU, 2020.

[11] **Anthony Ortiz**, Vincent Michalski, Kris Sankaran, Olac Fuentes, Christopher Kiekintveld, Pascal Vincent, Yoshua Bengio, Doina Precup, and Samira Ebrahimi Kahou, "Conditional Networks,"

[12] Alonso Granados, Mohammad Sujan Miah, **Anthony Ortiz**, and Christopher Kiekintveld, "A Realistic Approach for Network Traffic Obfuscation using Adversarial Machine Learning," in *Conference on Decision and Game Theory for Security* (GameSec 2020)

[13] Kolya Malkin, **Anthony Ortiz**, and Nebojsa Jojic, "Mining self-similarity: La-

bel super-resolution with epitomic representations," in *Proceedings of the 2020 European Conference on Computer Vision* (ECCV 2020)

[14] **A. Ortiz**, C. Robinson, D. Morris, O. Fuentes, C. Kiekintveld, M. M. Hassan, and N. Jojic, "Local Context Normalization: Revisiting Local Normalization," in *Proceedings of the 2020 IEEE/CVF Conference on Computer Vision and Pattern Recognition* (CVPR 2020), Seattle, WA, 2020 (Oral)

[15] Caleb Robinson, **Anthony Ortiz**, Kolya Malkin, Blake Elias, Andi Peng, Dan Morris, Bistra Dilkina, and Nebojsa Jojic. Human-Machine Collaboration for Fast Land Cover Mapping. *Association for the Advancement of Artificial Intelligence Conference* (AAAI 2020), New York, NY, 2020

[16] Vincent Michalski, Vikram Voleti, Samira Ebrahimi Kahou, **Anthony Ortiz**, Pascal Vincent, Chris Pal and Doina Precup. Comparing Normalization in Conditional Computation Tasks *Understanding and Improving Generalization in Deep Learning Workshop, held in conjunction with International Conference on Machine Learning* (ICML 2019), Long Beach, CA, 2019.

[17] **Anthony Ortiz**, Olac Fuentes, Dalton Rosario, and Christopher Kiekintveld. On the Defense Against Adversarial Examples Beyond the Visible Spectrum *Military Communications, track on Big Data and Machine Learning for Tactical Networks* (MILCOM 2018), Los Angeles, USA, 2018.

[18] Dalton Rosario, **Anthony Ortiz** and Olac Fuentes. 3D Terrain Segmentation in the SWIR Spectrum. *IEEE Workshop on Hyperspectral Image and Signal Processing Conference* (IEEE WHISPERS 2018), Amsterdam, The Netherlands, 2018.

[19] **Anthony Ortiz**, Alonso Granados, Olac Fuentes, Christopher Kiekintveld, Dalton Rosario and Zachary Bell. Integrated Learning and Feature Selection for Deep Neural Networks in Multispectral Images *14th IEEE Workshop on Perception Beyond the Visible Spectrum, held in conjunction with Conference on Computer Vision and Pattern Recognition* (CVPR 2018), Salt Lake City, Utah, 2018.

[20] Dalton Rosario and **Anthony Ortiz**. Spectral-elevation data registration using visible-SWIR spatial correspondence *SPIE Defense and Commercial Sensing* (DCS 2018), Orlando, Florida 2018.

[21] **Anthony Ortiz**, Dalton Rosario, Olac Fuentes and Simon Blair. Image-Based 3D Model and Hyperspectral Data Fusion for Improved Scene Understanding. *IEEE International Geoscience and Remote Sensing Symposium* (IGARSS), Fort Worth, Texas, 2017.

AWARDS

- AAAI Travel Grant. Association for the Advancement of Artificial Intelligence (AAAI), 2020
- Microsoft AI for Earth Research Grant. Amount: US $18,000. Microsoft Corporation, 2019
- Student Travel Grant. Graduate School, University of Texas at El Paso, 2018
- Good Neighbor Scholarship 2016-2017, 2017-2018. Texas Department of Higher Education
- Student Travel Grant. Graduate School, University of Texas at El Paso, 2017

- Anita Mochen Loya College of Engineering Graduate Fellowship, 2015 – 2016. UTEP College of Engineering, 2015
- Summa Cum Laude. Pontificia Universidad Catolica Madre y Maestra, 2010
- "Diploma de Maxima Excelencia 2008-2009". Dominican Government
- Sixth place winner in the eighth national competition of physics, 2009
- First place winner in the regional competition of math, 2008

COMPUTER SKILLS

Programming Languages: Python, Matlab, Java, C#
Misc: Tensorflow, Pytorch, OpenCV, Keras, Theano, Scipy, Scikit-learn
Strong Background in: Machine Learning, Computer Vision, Deep Learning, Remote Sensing, overhead image understanding

MENTORING

- Alonso Granados, PhD Student, University of Arizona
- Zachary Bell, Software Engineer, USAA
- Gerardo Uranga, Software Engineer, Microsoft

EXTRA-CURRICULAR ACTIVITIES

- LatinX in AI board member
- IEEE Student Member
- Climate Change Artificial Intelligence (CCAI) member

CONFERENCE REVIEWER

- CVPR 2018
- NeurIPS Latinx in AI workshop
- AAAI 2018
- AAAI 2019
- NeurIPS 2020