

JEFFERSON ENRIQUE HERNANDEZ CEVALLOS

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SUMMARY

- Ph.D student at Rice University advised by Vicente Ordóñez-Román, working on self-supervision on video inputs using masked auto-encoders. I have also recieved some funding from Google under the CURE program for this project.
- Ph.D. student with skills and experience in Computer Science, Machine Learning, Computer Vision and Big Data Analysis.
- Participated in projects on spatio-temporal sequence modelling, human action recognition, multi-object tracking, resulting in 7 peer-reviewed publications.
- Collaborative, observer and problem-solving professional; with great adaptability and self-educate capacity.

RESEARCH AND WORK EXPERIENCE

Rice University

Ph.D. student

Vision, Language and Learning Lab (vislang)

Aug 2022 to present

- Work on incorporating videos to the `ffcv` library so that they can be loaded faster. I have seen speed ups of 2x-5x compared to PyTorch dataloaders.
- Research on ViC-MAE a method that integrates Masked Autoencoders (MAEs) and contrastive learning to improve self-supervised learning from both images and videos. Submitted to CVPR 2024.

AdaViv

Computer Vision Engineer

AdaViv

Dec 2022 to Aug 2022

- Manage the whole computer vision Pipeline on AWS.
- Train and deploy image segmentation models for plants.
- Reduce inference cost across the board by introduction several optimizations.
- Develop and curate image segmentation datasets.
- Coordinate and manage efficient data labeling pipelines.

Escuela Superior Politécnica del Litoral

Research Assistant

Industrial Artificial Intelligence (INARI) Research Lab

Nov 2018 to Dec 2021

- Research on unsupervised feature extraction for sequential data using a modified restricted Boltzmann machine model. This project resulted on two publications.
- Worked on the design of a fast Multi-Object Tracking System for video, which is currently used by a retail brand in Ecuador, one of the laboratory funding companies. This project resulted on two publications.
- Took part on a project of Human Action Recognition through Pose estimation. The research was aimed towards robustness to camera angle variations.
- Led project to estimate conversion rates of retail stores using videos. This project can help estimate how much people who enter a store actually buy a product.
- Led project to calculate customer heatmaps from videos in a retail store. This project is used to better understand customer patterns and improve the layout of store facilities.

Escuela Superior Politécnica del Litoral

Student

Industrial Engineering Bachelor

Apr 2014 to Oct 2019

- Led a project to design a program that generates pricing policies and bus fleet schedules using integer linear programming for the university bus company (still used today). I developed a web interface for the program using Python and Django.
- Design a program that optimizes a congested traffic intersection in the university using discrete event based simulation. I used simulation software SUMO and a some C++.
- My thesis was about measuring manual labour performance automatically using cameras. This project will be used to assess operational decisions, to understand the origin of time losses caused by delays and their impact on the activities in manual tasks. This project resulted on two publications.

PUBLICATIONS

- **Hernandez, J.**, Villegas, R., & Ordonez, V. (2023). ViC-MAE: Self-Supervised Representation Learning from Images and Video with Contrastive Masked Autoencoders arXiv preprint arXiv:2303.12001.
- Kim, J. W., **Hernandez, J.**, Cobos, R., Palacios, R., & Abad, A. G. (2022, May). A View Invariant Human Action Recognition System for Noisy Inputs. In 2022 19th Conference on Robots and Vision (CRV) (pp. 67-74). IEEE.
- **Hernandez, J.**, Valarezo, G., Cobos, R., Kim, J. W., Palacios, R., & Abad, A. G. (2021). Hierarchical Human Action Recognition to Measure the Performance of Manual Labor. IEEE Access, 9, 103110-103119.
- **Hernandez, J.**, G. Valarezo, S. Lopez and A. Abad, (2020) "Automatic time and motion study using Deep Learning" (Accepted).
- Cobos, R., **Hernandez, J.**, & Abad, A. G. (2019, June). A fast multi-object tracking system using an object detector ensemble. In 2019 IEEE Colombian Conference on Applications in Computational Intelligence (ColCACI) (pp. 1-5). IEEE.
- Cobos R., **Hernandez, J.**, Abad A.G. (2019) Retail Traffic-Flow Analysis Using a Fast Multi-object Detection and Tracking System. In: Orjuela-Cañón A., Figueroa-García J., Arias-Londoño J. (eds) Applications of Computational Intelligence. ColCACI 2019. Communications in Computer and Information Science, vol 1096. Springer, Cham.
- **Hernandez, J.**, & Abad, A. G. (2018, May). Learning from multivariate discrete sequential data using a restricted Boltzmann machine model. In 2018 IEEE 1st Colombian Conference on Applications in Computational Intelligence (ColCACI) (pp. 1-6). IEEE.
- **Hernandez, J.**, & Abad, A. G. (2018, May). Spatial and Temporal Feature Extraction Using a Restricted Boltzmann Machine Model. In IEEE Colombian Conference on Applications in Computational Intelligence (pp. 3-13). Springer, Cham.

EDUCATION

- Ph.D student, Computer Science, Rice University, 2022-present.
- B.Sc., Industrial Engineering, Escuela Superior Politécnica del Litoral, 2014-2019.

TEACHING EXPERIENCE

- 2022 - Teaching Assistant for Deep Learning for Vision and Language.
- 2018 - Teaching Assistant for Integer Linear Programming.
- 2017 - Teaching Assistant for Operations Research.
- 2017 - Teaching Assistant for Advanced Statistics.
- 2016 - Teaching Assistant for Differential Equations.
- 2016 - Teaching Assistant for Multi-variable Calculus.

COMMUNITY SERVICE

- 2023 - Served as president of the Latin American Graduate Student Association at Rice University.
- 2019 - Served as a group mentor in a Machine Learning Hackathon. The group I advised ended third in the competition.
- 2019 - Served as a group mentor and challenge designer for my university programming Hackathon. The group I advised won the competition.
- 2018 - Gave free mentorships to students at my university the topics included programming, calculus, and linear algebra.
- 2017 - Security process re-design for children hospital.
- 2014 - Volunteer at a nursing home and a at kinder garden.

TECHNICAL SKILLS

- **Machine Learning Frameworks:** Proficient in: PyTorch, TensorflowV2, Keras and Jax.
- **Machine Learning:** Artificial Neural Networks; Supervised, Unsupervised and Reinforcement Learning.
- **Modeling:** Statistical and mathematical systems, Markov decision processes, industrial processes.
- **Optimization:** Linear programming, Integer programming, genetic algorithms.
- **Data Analysis:** Probabilistic and Statistical Analysis, Big Data, Database Management.
- **Project Management:** Budget planning, Project planning, and Task management.
- **Programming:** Python, R, MATLAB, GAMS.

OTHER SKILLS

Software: LaTeX, MySQL, Django, Word, Excel, and PowerPoint, Minitab, AutoCAD, Inventor.

Languages: English: professional proficiency (104 TOEFL). Spanish: native.