Gustavo **Vargas Hakim**

RESEARCH SCIENTIST - COMPUTER VISION - MACHINE LEARNING

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PROFESSIONAL OVERVIEW

Trilingual Machine Learning Researcher specializing **Computer Vision**, particularly in **test-time adaptation** and **industrial anomaly detection**. As a PhD candidate at École de Technologie Supérieure (ÉTS), I collaborate with **Zebra Technologies** under a research chair program, bridging academic research and industrial applications. My work has resulted in peer-reviewed publications at top venues, international research collaborations, and experience developing AI models for industry. I am also passionate for scientific communication, making complex concepts accessible to diverse audiences.

Machine Learning | Deep Learning | Computer Vision | Vision-language models | Test-time adaptation | Anomaly Detection | Evolutionary Computation | Applied research | Data modeling and analysis

WORK EXPERIENCE

Computer Vision research student 01/2022 - Present
Zebra Technologies *Montreal, Canada*

- Conducting applied research in industrial Anomaly Detection
- Collaborating with a cross-functional teams to implement *state-of-the-art* machine learning technologies
- Led the optimization of current products to double processing speeds on CPUs

EDUCATION

PhD in Computer Vision 09/2021 - 07/2025
École de Technologie Supérieure (ETS) *Montreal, Canada*

- Topic: Test-Time Adaptation of Computer Vision models
- Supervisors: Ismail Ben Ayed & Christian Desrosiers
- Research intern: **Sorbonne Université** under Prof. Nicolas Thome

Master's degree in Artificial Intelligence 08/2019 - 07/2021
University of Veracruz *Xalapa, Mexico*

- Topic: Neuroevolution of Convolutional Neural Networks

Bachelor's degree in Mechatronics Engineering 08/2013 - 01/2019
UPAEP *Puebla, Mexico*

- Exchange program: Oklahoma State University (Stillwater, US)

RELEVANT PUBLICATIONS

CLIPArTT: Adaptation of CLIP to New Domains at Test-Time

Vargas Hakim, G. A.*, Osowiechi, D.*, Noori, M., Cheraghalikhani, M., Bahri, A., Yazdanpanah, M., Ben Ayed, I., Desrosiers, C.

IEEE Winter Conference on Applications of Computer Vision (WACV), 2025, *Equal contributions

NC-TTT: A Noise Constrastive Approach for Test-Time Training

Osowiechi, D.*, ***Vargas Hakim, G. A.****, Noori, M., Cheraghalikhani, M., Bahri, A., Yazdanpanah, M., Ben Ayed, I., Desrosiers, C.

IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2024, *Equal contributions

ClusT3: Information Invariant Test-Time Training

Vargas Hakim, G. A.*, Osowiechi, D.*, Noori, M., Cheraghalikhani, M., Bahri, A., Ben Ayed, I., Desrosiers, C.

IEEE International Conference on Computer Vision (ICCV), 2023, *Equal contributions

TTTFlow: Unsupervised Test-Time Training With Normalizing Flow

Osowiechi, D.*, ***Vargas Hakim, G. A.****, Noori, M., Cheraghalikhani, M., Bahri, A., Ben Ayed, I., Desrosiers, C.

IEEE Winter Conference on Applications of Computer Vision (WACV), 2023, *Equal contributions

Hybrid encodings for neuroevolution of convolutional neural networks: a case study

Vargas Hakim, G. A., Mezura-Montes, E., Acosta-Mesa, H.-G.

Genetic and Evolutionary Computation Conference Companion (GECCO), 2021

PROFESSIONAL SKILLS

Programming: Python (advanced), MATLAB (intermediate), C/C++ (basic)

Libraries: PyTorch, NumPy, Pandas, SciPy, Scikit-learn, Matplotlib

Technical skills: Implementation and training of Deep Learning models for computer vision, Machine Learning algorithms, probabilistic modelling, vision-language models (VLMs), information theory

Environments: Linux, High-Performance Computing

Software: Graphic design (CorelDraw), Audio editing (Audacity, Reaper)

Other skills: scientific communication, presentation skills, public speaking, teaching, graphic design, group management

TEACHING

Tutorial lecturer 07/2022

Summer School on Deep Learning and Medical Imaging *Montreal, Canada*

· Lecturing on semi-supervised medical image segmentation

Lecturer 02/2019 - 06/2019

Universidad Euro Hispanoamericana *Xalapa, Mexico*

· Lectures: Linear algebra, control theory, measurements, electromechanical systems

Private tutor 01/2019 - 07/2021

· Tutoring elementary, secondary and high school students in mathematics and sciences

LANGUAGES

Spanish Native / **English** Fluent / **French** Fluent /