Oscar **Guarnizo**

Information Technologies Engineer · Junior Research Fellow

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Summary

I am a computer scientist with about four years of research experience since my undergraduate program. I am a dynamic and ambitious person with a great passion for mathematics, computer science, and machine learning. Currently, I hold a Junior Fellow Research position in DeepARC and Scientific Computing Group, where I am working on promising machine learning projects. My research interest is Reinforcement Learning, where I aim to reduce the gap between conceptual and real-world applications. Recently, I was in an internship position at KAUST, where I improved my analytical, programming, and research skills in the companion of masters and doctoral students. Additionally, this year, I participated in various workshops and summer schools, strengthening my basic knowledge and interpersonal skills. I also have professional experience since I held a Machine Learning Engineer position at DIGEVO, Santiago, Chile.

Academic Credentials

Yachay Tech University

Urcuqui, Ecuador

B.Sc in Information Technology — *Apr. 2015 - March. 2020*

- Received the *Cum Laude* recognition, CGPA 9.3/10, second-best grade of the promotion.
- Received formal education in Computer Science and Machine Learning.
- Obtained an IFTH Scholarship, given to promising students for higher education studies, covering all undergraduate expenses from 2015-2020.
- Thesis: Path Planning Simulation in Controlled Environments using Ant Colony Optimization Algorithms.
  Advisor: Israel Pineda Ph.D.

Research Experience

DeepARC Research

Urcuqui, Ecuador

Co-founder & Junior Research Fellow — *June 2021 - Present · 6 mos*

- Co-founded the group focused on research on deep learning for autonomous driving, robotics, and computer vision.
- Hold a Junior Research Fellow position in the Reinforcement Learning and Robotics research line.
- Collaborated with a research entitled *Deep Learning and Computer Vision in Smart Agriculture: Datasets, Models, and Applications*, aiming to enlighten the leading computer vision components needed to build intelligent agricultural applications.
- Collaborated with a research entitled *Intelligent System for Monitoring, Classifying, and Counting explorer and mondial Roses*, aiming to design, optimize, and implement an intelligent system based on convolutional neural networks and Nvidia Jetson Nano hardware.
  Advisor: Eugenio Morocho Ph.D.

King Abdullah University of Science and Technology (KAUST)

Thuwal, Saudi Arabia

Research Intern — *March 2021 - Aug. 2021 · 6 mos*

- Researched the theoretical and practical applications of Generative Adversarial Networks (GANs), particularly StyleGAN.
- Submitted weekly progress reports and participated in weekly group meetings, reviewing algebra, statistics, probability, StyleGAN interpretation, and mathematical understanding of neural networks.
- Implemented *Image2StyleGAN* to embed images into the StyleGAN latent space, programmed in PyTorch.
- Implemented subsequent image processing tasks, such as morphing, style transfer, expression transfer, inpainting, and super-resolution.
- Proposed cross-domain embedding between Anime and Human Faces StyleGAN generators.
  Advisor: Peter Wonka Ph.D.

Yachay Scientific Computing Group (SCG)

Urcuqui, Ecuador

Junior Research Fellow & Coordinator — *March 2020 - Present · 1 yr 9 mos*

- Coordinated and maintained the website, social networks, and computer resources (GitHub, GitLab, Discord, Notion).
- Supervised undergraduate research projects of different disciplines (Chemistry, Biology, and Information Technology).
- Led a project of three students entitled *Learning to Generate Complex Physics Using a Generative Adversarial Neural Network*, aiming to generate fluid dynamics simulations using GANs and Graph Neural Networks architectures.
- Researched a project entitled *Initializing Ant Colony Optimization with Random Walks*, which aims to figure out efficient ways to generate prior knowledge for ACO algorithms.
  Advisor: Israel Pineda Ph.D

Undergraduate Research Fellow — *Feb 2019 - March 2020 · 1 yr 2 mos*

- Submitted weekly reports, performed regular presentations, and attended regular individual and group meetings of the SCG research group.
- Conducted a project entitled *Path Planning Simulation in Controlled Environments using the Ant Colony Optimization Algorithm* as part of my undergraduate thesis, aiming to lay promising methods to deal with a fundamental path planning problem.
  Advisor: Israel Pineda Ph.D.

Neuromatch Summer School 2021

Los Angeles, United States · Virtual

Interactive Student & Project Lead | Certificate

Aug 2021 · 3 weeks

- Three-week intensive course focusing on theoretical DL modeling and computational techniques.
- Studied and implemented state-of-the-art RNN, CNN, VAE, GAN, and RL models in PyTorch.
- Connected with speakers and leaders from NGOs, research labs, companies, and academia.
- Led a research group of three students for developing a final research project in computer vision.
- Developed a transfer learning model for fMRI Tumor Classification using Pytorch and Kaggle Datasets.
  Tutor: Sean Byrne Ph.D. (candidate)

Eastern European Machine Learning Summer School 2021

Budapest, Hungary · Virtual

Apprenticeship | Certificate

July 2021 · 1 week

- Highly competitive one-week summer school on Deep Learning and Reinforcement Learning, which included 38 hours distributed on lectures, tutorials (coding sessions), poster presentations, panel discussions, reading groups, and mentorship.
- Reviewed and implemented trending state-of-the-art RL, GAN, RNN, VAE, CNN, Attention, and Graph Nets models, using Jax, Acme, and Haiku.
- Submitted a proposal based on the reproduction of an article entitled *Image2StyleGAN: How to Embed Images Into the StyleGAN Latent Space?*

Vilnius Machine Learning Workshop 2021

Vilniaus, Lithuania · Virtual

Apprenticeship | Certificate

July 2021 · 2 days

- Two-day workshop aimed to popularize Deep learning, Reinforcement Learning, and Causal Inference among students and practitioners.
- Reviewed topics related to Continual Learning, Generative Modeling, Causal Inference, Reinforcement Learning, Causal Bayesian Optimization.

International Summer School on Deep Learning 2021 - Gdańsk University of Technology

Gdańsk, Poland · Virtual

Apprenticeship | Certificate

July 2021 · 1 week

- One-week International Summer School on modern Deep Learning approaches, which included 40 hours approximately distributed on lectures and tutorials sessions.
- Reviewed and implemented state-of-the-art CNN, RNN, AE, VAE, Transformers, GAN, using Tensorflow and PyTorch.
- Connected with diverse participants, speakers, and leaders from NGOs, research labs, companies, and academia, mainly from Poland.

Workshop on Mathematical Introduction to Reinforcement Learning

Lahore, Pakistan · Virtual

Apprenticeship | Certificate

Jun 2021 · 3 days

- Practical sessions on Mathematical Introduction to Reinforcement Learning, organized by the Department of Mathematics of Lahore University of Management Sciences in collaboration with IMAGINARY, Berlin, Germany.
- Reviewed Reinforcemen Learning fundamentals, such as Markov Decision Processes, Bellman Equations, Value Iteration, Policy Iteration, Model-free methods, TD Learning, Q Learning, Double DQN, Actor-Critic, and Policy Methods.
- Connected with diverse participants and speakers from research labs, companies, and academia, mainly from Pakistan and Germany.

Yachay Tech University - School of Mathematical and Computational Science

Urcuqui, Ecuador

Research Assistant | Certificate

Jan 2018 – May 2018 · 5 mos

- Participated in a research group of four students (two nationals and two foreigners from the University of Montpellier) and the lead professor.
- Performed various activities, such as reviewing the literature, coding on diverse languages (such as R, JavaScript, and PHP), proposing statistical models, programming the web platform, discussing, and interpreting results.
- Developed a computer system for automatic surveys generation, using common statistical methods, called *Survey Generator System* (SGD).
  Advisor: Ernesto Ponsot-Balaguer Ph.D.

Research Assistant

Aug 2017 – May 2018 · 10 mos

- Participated in a research group conformed by three students and the lead professor, reviewing the literature, coding on Haskell, discussing, and interpreting results.
- Studied and implemented Wu's Algorithm to obtain the Voronoi Diagram of Quadrics written on Haskell, a functional programming language.
  Advisor: Francesc Antón Castro Ph.D.

Workshop on HPC, Big Data and Aplication I & II - IBM Ecuador

Urcuqui, Ecuador

Apprenticeship | Certificate

May 2017 2021 · 1 week

- Practical sessions on HPC, Big Data and Aplication I & II IBM Ecuador, organized by Yachap EP in collaboration with IBM Ecuador.
- Reviewed and studied state-of-the-art techniques for concurrence and parallel programming using the supercomputer Quinde I, Ecuador.
- Connected with national participants and the international head speaker, professor Yuefan Deng from Stony Brook University, United States.

Publications

Published

- Fonseca R, **Guarnizo O**, Suntaxi D, Cadiz A, Creixell W. *Convolutional Neural Network Feature Extraction Using Covariance Tensor Decomposition*. IEEE Access. 27 Apr 2021; pp. 9:66646-60. DOI: 10.1109/ACCESS.2021.3076033 (Open Access, Peer-reviewed)
- J. Pereira, D. Suntaxi, **O. Guarnizo**, F Villalba, and D. Almeida. *Comparison between Two Novel Approaches in Automatic Breast Cancer Detection and Diagnosis and its Contribution in Military Defense*. Developments and Advances in Defense and Security. Springer, Singapore, 2021; pp. 12. DOI: 10.1007/978-981-16-4884-7_15 (Peer-reviewed)
- **O. Guarnizo** and I. Pineda. *Three Dimensional Adaptive Path Planning Simulation Based On Ant Colony Optimization Algorithm.* The Sixth IEEE Latin American Conference on Computational Intelligence LA-CCI, IEEE. 11 Nov 2019; pp. 1-6. DOI: 10.1109/LA-CCI47412.2019.9037049 (Peer-reviewed)
- J. R. González, F. P. Zhapa, **O. V. Guarnizo** and F. Ortega-Zamorano. *Successive Adaptive Linear Neural Modeling for Equidistant Real Roots Finding*. Third Ecuador Technical Chapters Meeting (ETCM), IEEE. 15 Oct 2018; pp. 1-6. DOI: 10.1109/ETCM.2018.8580280 (Peer-reviewed)

In Review

- **O. Guarnizo** and I. Pineda, *Empirical PCA Evaluation of an ACO Algorithm for Path Planning*, 14th International Conference on Agents and Artificial Intelligence, ICAART, 3-5 February, 2022. pp. 12. (Peer-review)

In Press

- D. Suntaxi, **O. Guarnizo**, F. Crespo, S. Quintanchala, I. Pineda and M. E. Morocho. *Deep Learning and Computer Vision in Smart Agriculture: Datasets, Models, and Applications*. 8th International Conference on Information Management and Big Data (SIMBig2021). 01-02 Dec 2021; pp. 12. (Peer-reviewed)
- F. A. Castro, F. Zhapa, A. Ramos and **O. Guarnizo**. *Recent Developments in the Generalization of Voronoi Diagrams and their Application to Homotopy Continuation.* The Sixth International Conference on Analytic Number Theory and Spatial Tessellations. Kyiv, Ukraine, 24-28 Sep 2018; pp. 6. (Peer-reviewed)

Conferences and Presentations

- **Reproduction of Image2StyleGAN: How to Embed Images Into the StyleGAN Latent Space?**, at
  Research Groups Seminar Series, Yachay Tech University, Urcuqui, Ecuador, October 14, 2021.
  Eastern European Machine Learning Summer School 2021, Budapest, Hungary, July 7-15, 2021.
- **Path Planning Simulation in Controlled Environments using the Ant Colony Optimization Algorithm**, at
  Undergraduate Thesis Dissertation, Yachay Tech University, Urcuqui, Ecuador, March 10, 2020.
  The Sixth Latin-American Conference on Computational Intelligence, Guayaquil, Ecuador, November 11-15, 2019.
  Undergraduate Research Symposium, Yachay Tech University, May 19, 2019.
- **Successive Adaptive Linear Neural Modeling for Equidistant Real Roots Finding**, at
  The Third IEEE Ecuador Technical Chapters Meeting ETCM 2018, Cuenca, Ecuador, October 15-19, 2018.
  Conferences of Artificial Neural Networks and Applications, Yachay Tech University, Urcuqui, Ecuador, May 18, 2018.

Professional Experience

Digevo - Omia AI Group

Santiago, Chile

Machine Learning Engineer

Nov 2020 – March 2021 · 5 mos

- Researched promising methods for Image Classification tasks using Tensor Decomposition. The activities involved paper reviews, writing articles, training, and deployment of neural networks programmed in TensorFlow.
- Strongly contributed to a research project entitled *Convolutional Neural Network Feature Extraction using Covariance Tensor Decomposition*.
- Trained and deployed AI models based on neural networks for Computer Vision, using tools such as OpenCV, Tensorflow, NVIDIA Transfer Learning Toolkit, PyTorch, and Deepstream SDK.
- Designed and built an overall counting system for harvest grapes prediction based on MaskRCNN, using OpenCV, TensorFlow, and Pandas.
- Designed and built an overall ETL (Extract-Transform-Load) service using Apache Airflow to process raw files (metadata flows gotten from Machine Learning models) with different formats into a database.

  Supervisor: Ricardo Fonseca Ph.D.

Machine Learning Intern

Jul 2020 – Oct 2020 · 4 mos

- Trained and deployed AI models for Computer Vision, using tools such as Tensorflow, NVIDIA Transfer Learning Toolkit, and Deepstream SDK.
- Built and deployed a computer vision environment, where the infrastructure was based on Docker container, AWS stacks (Including EC2 and IAM), and DeepStream SDK, focusing on including Tensorflow models for License Plate Recognition.

  Supervisor: Ricardo Fonseca Ph.D.

Yachay Tech Computational Science Club

Urcuqui, Ecuador

Associate Instructor | Certificate

March 2021 – Abril 2021 · 2 mos

- Held an instructor position in a short course entitled *Introduction to Deep Learning and Computer Vision*.
- Assisted in material and class preparation, notebooks creation, assignments review, and lectures class.
- Taught fundamental principles about deep learning, particularly studying convolutional neural networks and transfer learning techniques.

ENES Training Program · Unidad Educativa Victor Manuel Guzman

Ibarra, Ecuador

Associate Instructor & Volunteer

March 2019 – Jun 2019 · 4 mos

- Held an instructor position in a high school course for higher education preparation.
- This project entitled "Inspirathon" aimed to prepare low-income students for the higher education admission exam.
- Imparted 2 to 3 classes weekly, assessing students' needs, providing information, and assisting them in doubts and problems.

Algorithms Course - Yachay Tech University

Urcuqui, Ecuador

Teaching Assistant

May 2018 – Jun 2018 · 2 mos

- Assisted the head professor on Algorithm Course for the assignments revision, exams revision, and tutorials for students.
- Completed 2 to 3 individual advising appointments weekly, assessing students' needs, providing information, and assisting them in doubts.

  Professor: Diego Peluffo Ph.D.

Honors & Awards

2020	**Scholarship**, Higher Education Scholarship. The scholarship covers all undergraduate expenses from 2015-2020, conferred by Instituto de Fomento del Talento Humano (IFTH) & SENESCYT	*Ibarra, Ecuador*
2019	**Finalist**, International Apps Tournament - TuApp 2019. Proposal: Computer Vision and Augmented Reality.	*Tabasco, Mexico*
2018	**Finalist**, International Apps Tournament - TuApp 2018. Proposal: AI E-commerce technology for services.	*Lima, Peru*

Skills

Languages	Spanish (Native), English (Advanced) TOEFL iBT 104/120 - C1
Programming Languages	Python, C, C#, Bash, Java, LaTex
Deep Learning Libraries	PyTorch, Tensorflow and Keras
Data Science Skills	Pandas, OpenCV, Jupyter Notebooks, Matplolib
Deployment DL Tools	Amazon AWS, Deepstream, Nvidia Transfer Learning Toolkit, Docker, Airflow

Memberships and Certifications

2019	**Professional Membership**, IEEE Young Professionals - Yachay IEEE Chapter. One year membership.	*Urcuqui, Ecuador*
2019	**Certification**, Participation in Hult Prize OnCampus 2019.	*Urcuqui, Ecuador*
2018	**Certification**, Implementation of Genetic Algorithms in Wolfram.	*Urcuqui, Ecuador*

Extracurricular Activities and Committees

Yachay Scientific Computing Summer School 2021

Urcuqui, Ecuador

Organizing Committee Member | Certificate — *Sep 2021 · 1 mo*

- Collaborated to the strategy of the *Yachay Scientific Computing Summer School 2021* agenda to increase the exposure of the research group.
- Assigned to moderate some lectures, journal club, and tutorial sessions.
- Partnered with international sponsors (DIGEVO) to guarantee financial aid that covered some needs of the event.
- Coordinated undergraduate, graduate, and work professionals to bring diverse perspectives to the audience.
- Maintained the event page and updated pertinent information.
- Supported the summer school materials and resources technically, such as notebooks, review articles, tutorials, videos, among others.
- Coordinated the programming challenge 2021, carried out the organization, development of templates, dissemination, and evaluation.

Alumni Yachay Tech

Urcuqui, Ecuador

Member — *March 2020 – Present · 1 yr 5 mos*

- Participated in regular meetings between former Yachay Tech students for organization and proposal activities.
- Shared relevant information to monitor the professional life of former Yachay Tech students.

Use and Diffusion of Technologies

Quito, Ecuador

Volunteer | Certificate — *Sep 2017 – Dec 2017 · 4 mos*

- Attended "La casa de la cultura" in Quito, Ecuador twice a week (around 40 hours in total) to perform oral presentations to students, school teachers and the general public.
- Participated in recreational and social activities to disseminate trending technologies in high-school students.

Yachay Open Source Software Club

Urcuqui, Ecuador

Member — *Jan 2017 – May 2018 · 1 yr 5 mos*

- Participated in regular meetings for tutorials, organization, and proposal activities.
- Encouraged the usage of open-source software tools on society and building networks on and off-campus.
- Organized the Latin American Festival of Open Source Installation 2018 - Flisol, where instilled the use of open-source technologies.

Yachay Environmental Awareness Club

Urcuqui, Ecuador

Core Member & Treasurer — *Jul 2016 – Dec 2017 · 1 yr 6 mos*

- Managed the club budget and participated actively according to the club's ideals about reducing waste production and excessive consumption.
- I released the campaign *No More Plastics*, aiming to reduce the consumption of disposable plastic packaging at the university.

Yachay Tech Japanese Club

Urcuqui, Ecuador

Member — *Jan 2016 – Jul 2017 · 1 yr 7 mos*

- Learned fundamental bases about the Japanese Language, particularly katakana, numbers, and common expressions.
- Attended classes of 2 hours per week, taught by Tomoko Kawamura, Ph.D., Club Advisor.
- Participated in recreational and social activities to acquire Japanese, including open houses, dances, traditional writing, and international fairs.