

Oscar Guarnizo

INFORMATION TECHNOLOGIES ENGINEER · JUNIOR RESEARCH FELLOW

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*"A dream becomes a goal by putting a date. A goal divided into steps becomes a plan.
A plan supported by actions becomes a reality"*

Summary

I am a computer scientist with 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 current focus is Reinforcement Learning because I consider it the most natural, formal, and robust way to define artificial intelligence. 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 was part of various workshops and summer schools, which reinforced my basic knowledge and improved my interpersonal skills. Regarding my professional life, in the last year, I held the position of Machine Learning Engineer at DIGEVO company in 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 Mathematics 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 · 4 mos

- Co-founded the group focused on fundamental and applied 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 the 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.

Yachay Scientific Computing Group (SCG)

Urcuqui, Ecuador

JUNIOR RESEARCH FELLOW & COORDINATOR

March 2020 - Present · 1 yr 7 mos

- Coordinated and maintained the website, social networks, and computer resources (GitHub, GitLab, Discord, Notion).
- Held a Program Committee Member position for the organization of the Yachay Scientific Computing Summer School 2021.
- Researched a project entitled *Initializing Ant Colony Optimization with Random Walks*, which aims to lay the foundations for future research in finding efficient ways to generate prior knowledge for ACO algorithms.
- Led a project 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.

Advisor: Israel Pineda Ph.D.

UNDERGRADUATE RESEARCH FELLOW

Feb 2019 - March 2020 · 1 yr 2 mos

- 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.
- Submitted weekly reports, performed regular presentations, and attended regular individual and group meetings of the SCG research group.

Advisor: Israel Pineda Ph.D.

King Abdullah University of Science and Technology (KAUST)

Thuwal, Saudi Arabia

RESEARCH INTERN

March 2021 - Aug. 2021 · 6 mos

- Reviewed and studied the theoretical and practical applications of Generative Adversarial Networks (GANs).
- Researched a particular architecture known as StyleGAN, which has provided a remarkable contribution in generating high-quality images.
- 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.
- Submitted weekly progress reports and proposed cross-domain embedding between Anime and Human Faces StyleGAN generators.
- Participated in weekly group meetings and reviewed algebra, statistics, probability, styleGAN interpretation, and mathematical understanding of neural networks.

Advisor: Peter Wonka Ph.D.

Neuromatch Summer School 2021

Los Angeles, United States · Virtual

INTERACTIVE STUDENT & PROJECT LEAD

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

July 2021 · 1 week

- Highly competitive one-week summer school on Deep Learning and Reinforcement Learning.
- 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.
- Connected with diverse participants, speakers, and leaders from NGOs, research labs, companies, and academia, mainly from Eastern Europe.
- 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 - EEML 2021

Vilnius, Lithuania · Virtual

APPRENTICESHIP

July 2021 · 2 days

- Two-day workshop aimed to popularize Deep learning, Reinforcement Learning, and Causal Inference among students and practitioners. It was organized as a satellite event for EEML summer school 2021.
- 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

July 2021 · 1 week

- One-week International Summer School on modern Deep Learning approaches.
- 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

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 Reinforcement 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.

The Sixth Latin-American Conference on Computational Intelligence, LA-CCI 2019

Guayaquil, Ecuador

RESEARCH PRESENTER

Nov 2019 · 1 week

- Presented a conference article entitled *Three Dimensional Adaptive Path Planning Simulation-Based On Ant Colony Optimization Algorithm*, which aimed to lay promising methods to deal with fundamental path planning problems.
- One-week conference seminar on Computational Intelligence related to Deep Learning and Swarm Intelligence applications. The event consisted of different scheduled activities, such as tutorials, networking, and lecture sessions.
- Connected with national and international participants and speakers from research labs, companies, and academia, mainly from Latin America.
- Participated in a two-day workshop on *Introduction to Clustering Methods* with a total duration of 12 hours.

The Third IEEE Ecuador Technical Chapters Meeting ETCM 2018

Cuenca, Ecuador

RESEARCH PRESENTER

Oct 2018 · 1 week

- Presented a conference article entitled *Successive Adaptive Linear Neural Modeling for Equidistant Real Roots Finding*, which aimed to find equidistant real roots using a neural model based on Self Organized Map (SOM) and an Adaptive Linear Neuron (Adaline).
- One-week conference seminar on theoretical and practical computational issues. The event consisted of different scheduled activities, such as tutorials, networking, and lecture sessions.
- Connected with national and international participants and speakers from research labs, companies, and academia, mainly from Ecuador.
- Participated in a one-day workshop on *Implementation of Genetic Algorithms in Wolfram* with a total duration of 8 hours.

Yachay Tech University - School of Mathematical and Computational Science

Urcuqui, Ecuador

RESEARCH ASSISTANT

Jan 2018 – May 2018 · 5 mos

- Developed a computer system for automatic surveys generation, using common statistical methods, called *Survey Generator System* (SGD).
- 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.

Advisor: Ernesto Ponsot-Balaguer Ph.D.

RESEARCH ASSISTANT

Aug 2017 – May 2018 · 10 mos

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

Advisor: Francesc Antón Castro Ph.D.

- Practical sessions on HPC, Big Data and Application 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)
- **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

- 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-review)

IN PRESS

- 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*. The 2021 Multidisciplinary International Conference of Research Applied to Defense and Security. Cartagena, Colombia, 24 Aug 2021; pp. 10. (Peer-reviewed)
- F. A. Castro, F. Zhapa, A. Ramos and **O. Guarnizo**. *Recent Developments in the Deneralization 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)

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 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. (candidate)

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. (candidate)

Yachay Tech Computational Science Club

Urcuqui, Ecuador

ASSOCIATE INSTRUCTOR

March 2021 – April 2021 · 1 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.

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 "Inspiration" 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

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|------|---|-----------------|
| 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: E-commerce technology for services. | Lima, Peru |

Language Skills

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|------|---|--------------|
| 2021 | English , English Level 104/120 TOEFL iBT - C1 | Home Edition |
| – | Spanish , Fully fluent - Mother tongue | |

Memberships and Certifications

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| 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 , Conferences of Artificial Neural Networks and Applications, Yachay Tech. | Urcuqui, Ecuador |
| 2018 | Certification , Implementation of Genetic Algorithms in Wolfram. | Urcuqui, Ecuador |
| 2017 | Certification , Use and Diffusion of Technologies (Volunteer). | Quito, Ecuador |

Extracurricular Activities

Yachay Scientific Computing Summer School 2021

Urcuqui, Ecuador

ORGANIZING COMMITTEE MEMBER

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.

Yachay Open Source Software Club

Urcuqui, Ecuador

MEMBER

Jan 2017 – May 2018 · 1 yr 5 mos

- Encouraged the usage of open-source software tools on society and building networks on and off-campus.
- Participated in various activities in order to promote open-source software; among them, the Flisol 2018 event stands out.
- Participated in regular meetings for tutorials, organization, and proposal activities.

Yachay Environmental Awareness Club

Urcuqui, Ecuador

CORE MEMBER & TREASURER

Jul 2016 – Dec 2017 · 1 yr 6 mos

- Managed the club budget to carry out various activities.
- Participated actively according to the club's ideals, aiming to reduce waste production and excessive consumption within 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, international fair.