Valerio Francesco Puglisi

Computer Science Ph.D. and Data Scientist Consultant with passion for LLM, Computer Vision and Audio.

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SKILLS

- ***Programming Languages***: Python, C, Java, Javascript, TypeScript, Bash.
- ***Data manipulation***: Pandas, SQL (MySQL, MariaDB), NoSQL (MongoDB), PL-SQL(Oracle)
- ***Machine & Deep Learning***: Scikit-learn, PyTorch, Tensorflow, Tensorflow-Lite, TensorBoard, Gradio, Keras, HuggingFace, Numpy.
- ***Data Visualization***: Matplotlib, Seaborn, Plotly.
- ***Generative AI***: LangChain + ChatGPT + LLama (Ollama).
- ***Deep Learning / Computer Vision***: TorchVision, Ultralytics, OpenCV.
- ***Deep Learning / Audio Analysis***: TorchAudio, Librosa, PyRoomAcoustics.
- ***Scraping***: BeautifulSoup, Selenium.
- ***Frontend Programming:*** Angular, Vue.js, HTML, CSS, Bootstrap.
- ***Backend Programming***: Java SpringBoot, Flask, Django.
- ***Control Version System***: Git, Subversion, Bitbucket, Sourcetree, RTC (IBM)
- ***IDE and Editor:*** CursorAI, Visual Studio Code, Intellij, WebStorm, PyCharm, Clion, PhpStorm, Vi/Vim
- ***Operating System***: Linux, Mac, Windows.
- ***Security tools:*** Shodan, Recon-ng, Wireshark, Nmap, Venom

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WORK EXPERIENCE

1. University of Catania: Department of Engineering https://www.dieei.unict.it/en

Deep Learning Engineer Consultant   *Catania, Italy* 01/2024 - 06/2024

- Working with Ferrari on a Data Science Project.
- Developing State Of The Art Object Detection like YoloV8, DINO, DiffusionDet, RTMDet and CO-DETR and Object Tracking with Deep Sort, Byte Track and Supervision.
- Working on Data Visualization Algorithms like PCA and T-SNE.
- Data Cleaning and Data Synthesis via Generative models (GAN).
- Developing Audio Classifiers with noise robustness for the environment .
- Writing scientific papers on research results for IEEE and MDPI research community.
- Skills: GitLab · OpenMMLab · Computer Vision · Object Detection · Object Tracking · Deep Learning · PyTorch · Python

2. ParkSmart s.r.l. http://www.parksmart.it

Deep Learning Engineer Consultant   *Catania, Italy* 06/2023 - 12/2023

- I developed NVIDIA DeepStream custom pipelines with Python Bindings for Computer Vision.
- Pipelines were composed including Gst-nvtracker (that runs withYOLOV8), Gst-nvtracker (DeepSort, ..) and Gst-nvdsanalytics applied on real-time tasks.
- Test accuracy performance between YOLOV8 native and DeepStream Implementation.
- Skills: Deep Learning · Python · PyTorch · JIRA · NVIDIA DeepStream

3. Vicosystems s.r.l. http://www.vicosystems.it

Machine Learning & Deep Learning Engineer Consultant   *Catania, Italy* 03/2021 - 06/2023

- Designed and developed Unsupervised Predictive Maintenance System via Deep Learning Anomaly Detection models for Smart Industries context with Multivariate Time Series inputs from sensors for the SMILE project sponsored by PON/FESR.
- I am creating a multimodal deep learning system capable of performing the classification task in the audio field.
- This approach involves the use of different neural networks used in a combined way and nowadays it is widely used as it makes the system robust against possible loss of input data of a neural network. (So the idea is to have multiple networks combined in order to increase the overall accuracy and robustness of the latter in case one of them fails).
- Developed Frontend WebApp for the SmartRoad4.0 project sponsored by PON/FESR.
- Skills: Python, Pytorch, Tensorflow, Tensorflow Lite, ONNX, Keras, Numpy, Pandas, and Librosa, Angular12, Angular Material, RxJS, Socket.io,.

4. Paycasso LTD www.xydus.com

Full Stack Developer & Machine Learning Engineer Consultant   *Remote, London* 10/2020 – 03/2021

- Full stack microservices web application development.
- Developed Backend application of Paycasso Image Labeler Web Application.
- Developed Frontend application of Paycassoo Image Labeler Web Application.

- Deploying microservices web application with Docker and Docker Compose.
- Skills: Vue.js · Vuetify · Typescript · Axios · Java SpringBoot · Kafka · Maven · Hibernate · AWS · Java SDK · Protobuf · Docker.

5. *Reply s.r.l.* www.reply.com
Full Stack Developer & Software analyst Reply Cluster Financial Services   *Milan, Italy:* 10/2019 -10/2020

- Developer and software analyst using Full Stack technologies for Intesa Sanpaolo Bank's web applications.
- Research with R&D group on Fintech and Banking for automatisation of economy customer model with Earnix.
- Skills: Angular · Java · SpringBoot · Maven · SQL · PL-SQL· Bash Script Programming · GIT · Access2016.

6. *Vicosystems s.r.l.* http://www.vicosystems.it
Machine Learning Engineer & Full Stack Developer   *Catania, Italy* 02/2019 - 10/2019

- Created Labeling Tool for Machine Learning Projects.
- Developed an audio system for rainfall classification. Convolutional neural networks for audio classification of rainfall, processing audio signal as a 2D signal with Pytorch, PyAudio, Numpy, Pandas, RaspberryPI mod 3B+, Amazon Web Services.
- Developed Deep Learning infrastructure in projects supported by the European Community (EIC): A smart monitoring health system for cattle with OpenCV and Darknet in Python.

Streaming Engineer & Full Stack Developer   *Catania, Italy* 01/2018 - 12/2018

- Developed remote assistance software that allows any operator equipped with a RaspberryPy (with integrated camera and a Bluetooth earpiece) to communicate with the relative technician in case of remote assistance, by creating virtual audio/video rooms based on the WebRTC protocol.
- Implemented a client for the operator on Raspberry 3B+. Configured and implemented different mods of Janus WebRTC Gateway. Implemented a web client for technicians.
- Made with these technologies: HTML, Javascript, Jquery, Bash scripting, Linux Procedure, Nginx, Janus Gateway.

Full Stack Developer   *Catania, Italy* 09/2016 - 10/2018

- Developed a search engine (VSearch - www.vsearch.it) for internet contacts recovery. This project is developed on the back-end side in Python through the Flask and Celery framework and is based on web scraping and crawling techniques. Regarding the front-end side, the technologies used are Jinja2, Html5, Bootstrap, CSS, Javascript, Jquery, and AngularJs.

EDUCATION
Università degli Studi di Catania http://web.dmi.unict.it/
PhD in Computer Science: Machine Learning & Deep Learning   *Catania, Italy* 10/2020 - 10/2023

- The proposed research activity aims to operate on the state of the art in order to identify and improve techniques like Automatic Speech Recognition and Speech Separation.
- The project included a period of study abroad at the research group of Dr Salvatore Livatino, University of Hertfordshire, UK and a period of study at the company iCTLab s.r.l. (https://www.ictlab.srl/) a spinoff of the University of Catania specialized in digital investigations that over the years has developed know-how on the current issue.

Master's Degree (MS) in Computer Science: Security & Artificial Intelligence   *Catania, Italy* 10/2015 - 09/2019
- Thesis: Smart Mirror, a dissertation on the development of a software system able to predict clothing comfort relatively to the weather.
- Final degree mark: 110/110
- Coursework: Artificial Intelligence, Computer and Network Security, Cryptography, P2P Networks, Distributed Systems, Numerical analysis, Optimization, Machine Learning and Deep Learning.

Bachelor's Degree (BS) in Computer Science   *Catania, Italy* 09/2011 - 03/2016
- Thesis: A client-server system of wavelet cryptography
- Final degree mark: 100/110
- Coursework: Algorithms and Data Structure, Computer Architecture, Computer Networks, Databases, Distributed Programming, Imperative and Object Oriented Programming, Multimedia and Image Processing, Network Security, Operating System, Software Engineering.

***High School Guglielmo Marconi*: Diploma in Electronics specialization**   *Catania, Italy* 09/2006 - 07/2011
- Thesis: Derivational AmpOp (Operational Amplifiers) - Final diploma mark: 85/100

PUBLICATIONS

1. Conference: ***A Convolutional Neural Networks Approach to Audio Classification for Rainfall Estimation.*** 2019 10th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems. September 2019, Technology and Applications (IDAACS), Francesco Beritelli's Lab: Roberta Avanzato, Francesco Beritelli Francesco Di Franco, Valerio Puglisi DOI: 10.1109/IDAACS.2019.8924399

2. Conference: ***A CNN-based Audio Sensor for Rainfall Estimation: Implementation on Embedded Board***. The 11th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications 22-25 September 2021, Cracow, Poland. Michele Russo, Valerio Francesco Puglisi, Roberta Avanzato, Francesco Beritelli

3. Conference: ***Dairy Cow Behavior Recognition Using Computer Vision Techniques and CNN Networks.*** The 2022 IEEE conference on Internet of Things and Intelligent Systems (IoTaIS) - Bali, Indonesia · Nov 24, 2022: Lab: Francesco Beritelli's Lab: Roberta Avanzato, Francesco Beritelli Francesco Di Franco, Valerio Puglisi.

4. Conference: **Deep Audio Analyzer: A Framework to Industrialize the Research on Audio Forensics**. The 2023 IEEE International Conference on Metrology for eXtended Reality, Artificial Intelligence and Neural Engineering - IEEE MetroXRAINE 2023 – Milan, Italy · Oct 25-27, 2023: Lab: Valerio Francesco Puglisi, Oliver Giudice, Sebastiano Battiato

PROJECTS & ACTIVITIES
Università Degli Studi di Catania Catania, Italy

SATURN (System to predict optimize industries production**)**   12/2020 - 01/2021

● I am also working on the Saturn project, approved by the European Community which involves entities such as the Department of Mathematics and Computer Science of the University of Catania and STMicroelectronics.

This project has several objectives, the part I carried out is related to the part increasing the multichip production in the factory. The study currently addressed leads to the modeling of the problem known as Flexible Job Shop Scheduling Problem, a hard NP optimization problem. Today some of these take into consideration operational research but above all deep learning and reinforcement learning.

Smart Mirror MS Thesis (A.I. System to predict clothes day comfort relative to the weather **)**   03/2019 - 09/2019

● Designed and implemented data structures and artificial intelligence algorithms to detect people and their parts.

● Research on many types of Convolutional Neural Networks' performance on clothes classification by season;

● Clothes comfort prediction by correlation with the weather of the day (drawn from the internet) and the classified clothes' season with OpenCV and Keras.

An implementation in C of Secure and Practical IBE of Walters's Scheme   09/2018 - 01/2019

● Implemented a library that performs the functions of the above-mentioned project with two different types of low-level cryptographic libraries: PBC Pairing Based Cryptography, and Nettle.

● Implemented performance tests based on execution time by changing the size of messages. Implemented a hybridization of an asymmetric cryptosystem developed with a typical symmetric cryptosystem, namely AES256.

● Designed data structures, optimized precomputation and implemented cryptosystems.

Develop of Egocentric shopping cart localization (Supermarket indoor localization)   07/2018 - 09/2018

● Implemented Convolutional Neural Networks (CNN: Densenet, Alexnet, Squeezenet) to classify, predict coordinates by linear regression and compare learning results performance.

● Designed image dataset processing with different transforms, Created Dataset loader.

● Compared results with accuracy and loss graphs.

● Results**:** Accuracy of 87% on the test set.

LANGUAGES: Italian (mother tongue), English (C1). # INTERESTS IT, Music, piano playing, singing.