FEDERICO MANZELLA

Symbolic Machine Learning Researcher

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447vVgEAAAAJ · Federico-Manzella · npmjs

ABOUT ME

I am currently holding the triple role of DevOps Engineer, Lead Developer and AI Scientist at IN MM S.r.l. Every day, I am driven by the challenge of pushing technological boundaries while delivering practical solutions that meet the company's needs. As a DevOps Engineer I design and implement complex CI/CD pipelines, locally or in-cloud, to enhance operational efficiency. As the Lead Developer, I guide my team in crafting robust software architectures and writing efficient, maintainable code. Simultaneously, as an AI Scientist, I delve into the depths of artificial intelligence, exploring novel algorithms and techniques to enhance products with intelligent capabilities eventually using handcrafted AI algorithms. It is a thrilling journey, blending creativity with precision, while navigating the cutting edge of technology.

I was a Symbolic Machine Learning researcher at the ACL[AI] Lab at the University of Ferrara (Italy) since my first year of bachelor's degree in Computer Science. I contributed both in the theoretical and implementation part of algorithms for data analysis and machine learning and in the design and implementation of a framework for Symbolic Machine Learning in Julia programming language.

But my first love, and the reason I started studying computer science, is Videogame Development. I started when I was 13, copying and modifying code around the web until I designed, developed and published various games on many digital distribution services.

I am looking forward to make these two worlds, the machine learning on the one hand and game development on the other, collapse into one.

EXPERIENCE

DevOps Engineer, Lead Developer and AI Scientist

IN MM S.r.l. (In Manibus Meis)

2024 – Ongoing

- project planning and management and technical leadership;
- research and development;
- software architecture and design;
- AI integration and development;
- data management and intelligent analysis;
- data gathering with real time applications;
- AI model development and deployment;
- team mentoring and collaboration;
- problem solving and troubleshooting;
- code development, reviews and quality assurance;
- workflow definition and implementation (CI/CD);
- risk management and mitigation;

MY LIFE PHILOSOPHY

"Behind every problem there is an opportunity." cit. Galileo Galilei

"The only way to go fast is to go well." cit. Uncle Bob

"Formal education will make you a living; self-education will make you a fortune." cit. Jim Rohn

STRENGTHS

Self-taught · Eye for detail · Fast learner · Problem solving

LANGUAGES

Italian ●●●●●

English ●●●●◐

Spanish ●◐○○○

EDUCATION

M.Sc. in Artificial Intelligence, Data Science and Big Data

University of Ferrara

Sept 2023 – Ongoing

Topics: artificial intelligence, machine learning, data analysis, computer vision, NLP.

B.Sc. in Computer Science

University of Ferrara

Sept 2020 – March 2023

Grade: 109 / 110
Thesis: The Voice of COVID-19: Breath and Cough Recording Classification with Temporal Decision Trees and Random Forests **Topics:** computability and computational complexity, computer graphics, database, data structures, software engineering.

- continuous improvement;
- performance management and resource allocation;
- requirements gathering and customer focus.

Symbolic Machine Learning Researcher

ACLAI (Applied Computational Logic and Artificial Intelligence)

2021 – Ongoing

- research and study of transparent intelligent systems;
- research and study of feature selection methods;
- study of temporal data of physiological origin (EEG, ECG) and audio;
- design and development of a machine learning framework `Sole.jl` and study of unstructured data with symbolic methods in the Julia programming language.

Indie Game Developer and Designer

Month 2019 – Ongoing

- Book Hunter - designed, developed and published a stealth adventure game on Steam;
- Thats Why You Always Lose Your Keys - designed, developed and published an humorous strategic game on itch.io;
- Staring - designed, developed and published an humorous puzzle game on itch.io;
- Poing Jump - designed, developed and published an hyper casual game on Google Play Store;
- currently developing a platformer game based on pseudo-realistic magnet physic using Godot 4 Game Engine (previously in Unity);
- currently developing a rhythm game for Android with Godot 4 Game Engine (based on the idea from a game developed for a Game Jam);
- currently designing and developing an online board game in Node.js.

PUBLICATIONS

Journal Articles

- M. Coccagna, **F. Manzella**, S. Mazzacane, G. Pagliarini, V. Sironi, A. Gatti, E. Caselli, and G. Sciavicco, "Towards an objective theory of subjective liking: A first step in understanding the sense of beauty," *Plos one*, vol. 18, no. 6, e0287513, 2023. DOI: 10.1371/journal.pone.0287513.
- **F. Manzella**, G. Pagliarini, G. Sciavicco, and I. E. Stan, "The voice of COVID-19: breath and cough recording classification with temporal decision trees and random forests," *Artificial Intelligence in Medicine*, vol. 137, p. 102 486, 2023. DOI: 10.1016/J.ARTMED.2022.102486.

Conference Proceedings

- L. Balboni, M. Ghiotti, **F. Manzella**, M. Milella, G. Pagliarini, A. Paradiso, G. Sciavicco, and I. E. Stan, "Symbolic learning workflows in Sole.jl," in *Julia Programming Language Convention (JuliaCon 2024)*, 2024. [Online]. Available: https://www.youtube.com/live/f7CLxthbZes?feature=shared&t=11699.

Advanced training course in Game Design and Development

ECIPAR Bologna

Nov 2019 – Dec 2020

Topics: game design, level design, game development, game production, workflow organization (Slack, Git), C# programming language, Unity (game engine), Unreal Engine 4 (the basics), video games history.

DRIVER'S LICENSE

Car: B

PROGRAMMING

Bash/Shell	●●●●●
Julia	●●●●●
Python	●●●●●
C/C++	●●●●●
C#	●●●●●
GDScript	●●●●●
LaTeX	●●●●●
Java	●●●●○
Kotlin	●●●●○
Vala	●●●◐○
MATLAB	●●●○○
R	●●●○○
Prolog	●●◐○○
Rust	●●◐○○
Fortran	●●○○○
Swift	●○○○○
Ruby	◐○○○○

TypeScript/JavaScript	●●●●●
HTML/CSS	●●●●●
PHP	●●●●○
SQL	●●●●○

CG	●●●●○
GLSL	●●●●○
HLSL	●●●●○
Godot Shading Language	●●●●●

MY TOOLBOX

- **OS:** Fedora GNU/Linux.
- **Editor/IDE:** Kate/KDevelop, Atom/Pulsar, VS Code/VS Codium, Zed.
- **Teamwork and Workflow:** Git, GitHub, GitLab, Slack, Discord, Microsoft Sharepoint.
- **Machine Learning:** Sole.jl, MLJ, TensorFlow, Keras, scikit-learn.

- L. Balboni, M. Ghiotti, **F. Manzella**, M. Milella, G. Pagliarini, A. Paradiso, G. Sciavicco, and I. E. Stan, "Third millennium symbolic learning with Sole.jl," in *Julia Programming Language Convention (JuliaCon 2023)*, 2023. [Online]. Available: https://www.youtube.com/watch?v=HTRhOmQIObg.
- P. Cavina, **F. Manzella**, G. Pagliarini, G. Sciavicco, and I. E. Stan, "(un)supervised univariate feature extraction and selection for dimensional data," in *Proceedings of the 2nd Italian Conference on Big Data and Data Science (ITADATA 2023), Naples, Italy, September 11-13, 2023*, ser. CEUR Workshop Proceedings, vol. 3606, CEUR-WS.org, 2023. [Online]. Available: https://ceur-ws.org/Vol-3606/paper51.pdf.
- D. Del Fante, **F. Manzella**, G. Sciavicco, and I. E. Stan, "A postmodern approach to automatic metaphor identification," in *Proceedings of the 9th Italian Conference on Computational Linguistics, Venice, Italy, November 30 - December 2, 2023*, ser. CEUR Workshop Proceedings, vol. 3596, CEUR-WS.org, 2023. [Online]. Available: https://ceur-ws.org/Vol-3596/short10.pdf.
- M. Ghiotti, **F. Manzella**, G. Pagliarini, G. Sciavicco, and I. E. Stan, "Evolutionary explainable rule extraction from (modal) random forests," in *ECAI 2023 - 26th European Conference on Artificial Intelligence, September 30 - October 4, 2023, Kraków, Poland - Including 12th Conference on Prestigious Applications of Intelligent Systems (PAIS 2023)*, ser. Frontiers in Artificial Intelligence and Applications, vol. 372, IOS Press, 2023, pp. 827–834. DOI: 10.3233/FAIA230350.
- **F. Manzella**, G. Pagliarini, G. Sciavicco, and I. E. Stan, "Efficient modal decision trees," in *22nd International Conference of the Italian Association for Artificial Intelligence (AIxIA 2023)*, Springer Nature Switzerland, 2023, pp. 381–395. DOI: 10.1007/978-3-031-47546-7_26.
- M. Coccagna, **F. Manzella**, S. Mazzacane, G. Pagliarini, and G. Sciavicco, "Statistical and symbolic neuroaesthetics rules extraction from EEG signals," in *Artificial Intelligence in Neuroscience: Affective Analysis and Health Applications - 9th International Work-Conference on the Interplay Between Natural and Artificial Computation, IWINAC 2022, Puerto de la Cruz, Tenerife, Spain, May 31 - June 3, 2022, Proceedings, Part I*, ser. Lecture Notes in Computer Science, vol. 13258, Springer, 2022, pp. 536–546. DOI: 10.1007/978-3-031-06242-1_53.
- **F. Manzella**, G. Pagliarini, G. Sciavicco, and I. E. Stan, "Interval temporal random forests with an application to COVID-19 diagnosis," in *28th International Symposium on Temporal Representation and Reasoning, TIME 2021, September 27-29, 2021, Klagenfurt, Austria*, ser. LIPIcs, vol. 206, Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2021, 7:1–7:18. DOI: 10.4230/LIPICS.TIME.2021.7.

Thesis co-supervisor

- E. Favale, "TRAMA: Caso di studio per design e sviluppo di applicazioni real-time," Bachelor's Thesis, 2024.
- G. Linguerri, "Uso, interazione e didattica con il robot NAO," Bachelor's Thesis, 2024.
- G. Nella, "Manipolazione di oggetti con il robot NAO," Bachelor's Thesis, 2024.
- E. Samaritani, "Analisi intelligente di dati applicata allo studio della consistenza e della permanenza della memoria: Un caso di neurofisiologia," Bachelor's Thesis, 2024.

- **Game Engine:** Godot 4, Unity, Unreal Engine.
- **Audio Editing:** Audacity, LMMS, FMOD, Wwise, Ardour 7/8, Guitar Pro 6/7/8, VCV Rack.
- **Image Editing:** GIMP, Adobe Photoshop, Krita, Inkscape, Aseprite, Spine.
- **Database:** MySQL, SQLite, PostgreSQL, MongoDB, Liquibase.

- L. Serrentino, “Decodificare la percezione estetica: Estrazione di regole logico-simboliche da eye-tracking e pupillometria per un’explainable AI nella neuroestetica,” Bachelor’s Thesis, 2024.
- D. Carbini, “A new automatized method for the analysis of eeg recordings,” Bachelor’s Thesis, 2023.
- P. Cavina, “Estrazione e selezione delle features (non) supervisionata univariata per dati dimensionali,” Bachelor’s Thesis, 2023.
- M. Ghiotti, “Un pacchetto di analisi post-hoc di modelli di apprendimento modali simbolici,” Bachelor’s Thesis, 2023.
- M. Specchia, “Metodi simbolici per l’estrazione di conoscenza da elettroencefalogrammi,” Bachelor’s Thesis, 2023.
- L. Balboni, “Analisi del segnale elettroencefalografico: Un metodo per la selezioni automatica di variabili dimensionali,” Bachelor’s Thesis, 2022.

PROJECTS

Sole.jl

Dec 2020 – Ongoing

A framework for symbolic, transparent, and interpretable machine learning!

Godot Easing Functions

Feb 2020 – Ongoing

Bring the powerful easing functions to Godot Game Engine.

SimpleCaching.jl

Dec 2020 – Ongoing

A Julia package providing macros to cache result(s) of function calls.

Ferdiu Engine

Feb 2023 – Ongoing

I’m building a Game Engine from scratch in C++. I started this project for Computer Graphics exam project but I was having so much fun while doing it that I decided to go further with it.

NVIDIA Optimus Tools for Linux

Jun 2020 – Ongoing

I developed, forked and trying to maintain as often as possible some tools to make it simple to use NVIDIA Optimus technology on Linux (mostly for Debian GNU/Linux), including:

- optimus-indicator: simple indicator for the system tray with Bumblebee and nvidia-xrun support;
- nvidia-xrun: utility to run separate X with discrete nvidia graphics with full performance;
- nvrun: makes the coexistence of bumblebee and nvidia-xrun comfortable.

Embedded Controller Tools for MSI Laptop for Linux

Sep 2022 – Ongoing

I developed, forked and trying to maintain as often as possible some tools to make up for the lack of tools for GNU/Linux systems to control the Embedded Controller of MSI laptops (e.g. *Dragon Center* and *MSI Center*), including:

MY HOBBIES

- music writer;
- play guitar (electric and acustic);
- play piano;
- home automation: Raspberry Pi, Arduino UNO, Home Assistant and custom services;
- game development;
- running;
- share my open-source with the community.

- isw: Ice-Sealed Wyvern (forker to add support for MSI Katana GF66 12UG);
- isw-indicator: an Indicator app for my version of isw.

WWiser Launcher

Sep 2022 – Ongoing

A set of BASH and Python scripts for Linux which aims to replace the Wwise Launcher. This was achieved reverse-engineering the original launcher and the application protocol it use to fetch informations and assets from Audiokinetic servers.

SRTranslate

Jul 2021 – Ongoing

Translate a subtitles `*.srt` file to any language using Google Translate API. Before translating any line of the subtitle file, this application tries to join some adjacent lines to give the translator some context to outputs more accurate translations.

React-Native MDs - Movesense library

Jun 2024 – Ongoing

A library for React Native to easly allow to develop mobile apps that interact with the heart rate monitor band by Movesense.