

# FEDERICO MANZELLA

## Symbolic Machine Learning Researcher

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## ABOUT ME

I am 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 video [Game 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



### Symbolic Machine Learning Researcher

#### ACLAI (Applied Computational Logic and Artificial Intelligence)

 2021 - Ongoing  Ferrara (FE)

- 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  Ferrara (FE)

- [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.

## 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

## 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.

Advanced training course in Game Design and Development

### ECIPAR Bologna

 Nov 2019 - Dec 2020

# PUBLICATIONS

## Journal Articles

- M. Coccagna, **F. Manzella**, S. Mazzacane, G. Pagliarini, V. Sironi, A. Gatti, E. Caselli, and G. Sciavico, "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. Sciavico, 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. 102486, 2023. DOI: 10.1016/J.ARTMED.2022.102486.

## Conference Proceedings

- L. Balboni, M. Ghiotti, **F. Manzella**, M. Milella, G. Pagliarini, A. Paradiso, G. Sciavico, 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. Sciavico, and I. E. Stan, "(un)supervised univariate feature extraction and selection for dimensional data," in *2nd Italian Conference on Big Data and Data Science (ITADATA 2023)*, 2023.
- D. Del Fante, **F. Manzella**, G. Sciavico, and I. E. Stan, "Towards symbolic metaphor identification," in *9th Italian Conference on Computational Linguistics (CLIC-IT 2023)*, 2023.
- M. Ghiotti, **F. Manzella**, G. Pagliarini, G. Sciavico, 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. Sciavico, and I. E. Stan, "Efficient modal decision trees," in *22nd International Conference of the Italian Association for Artificial Intelligence (AlxIA 2023)*, 2023.
- M. Coccagna, **F. Manzella**, S. Mazzacane, G. Pagliarini, and G. Sciavico, "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. Sciavico, 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.

**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	●●●●●●
Vala	●●●●●●
R	●●●●●●
Prolog	●●●●●●
Rust	●●●●●●
Fortran	●●●●●●
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.
- Teamwork and Workflow:** Git, GitHub, GitLab, Slack, Discord,
- Machine Learning:** Sole.jl, MLJ, TensorFlow, Keras, scikit-learn.
- Game Engine:** Godot 4, Unity, Unreal Engine.
- Audio Editing:** Audacity, LMMS, FMOD, Wwise, Ardour 7, Guitar Pro 6/7/8, VCV Rack.
- Image Editing:** GIMP, Adobe Photoshop, Krita, Inkscape, Aseprite, Spine.
- Database:** MySQL, MongoDB.

## PROJECTS

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### Sole.jl

📅 Dec 2020 – Ongoing

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

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### Godot Easing Functions

📅 Feb 2020 – Ongoing

Bring the powerful easing functions to Godot Game Engine.

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### SimpleCaching.jl

📅 Dec 2020 – Ongoing

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

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### 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.

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### 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;
  - [nvrund](#): makes the coexistence of bumblebee and nvidia-xrun comfortable.
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### 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:

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

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### 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.

## MY HOBBIES

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- music writer;
- play guitar (electric and acoustic);
- play piano;
- home automation: Raspberry Pi;
- running;
- share my open-source with the community.

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I give consent to process my data with the purpose of the recruitment process, in accordance to the Regulation of the European Parliament 679/2016, regarding the protection of natural persons and free movement of such data.