Ivan Carnevali

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Gender: Male **Date of birth:** 18/06/2002 **Nationality:** Italian, Canadian

WORK EXPERIENCE

INFN - Istituto Nazionale Fisica Nucleare https://www.infn.it/

City: Frascati (Roma) | **Country:** Italy

[07/2025 – 09/2025] **Summer Internship**

VIP Experiment – Pulse Shape Analysis

- Developed methods for **automatic pulse shape analysis** with BEGe detectors.
- Applied **classical machine learning algorithms** (Random Forest, Gradient Boosting, etc.) to extracted waveform features, achieving high classification accuracy and solid benchmarks.
- Designed and implemented a **deep learning pipeline** (CDAE+FAE+GMVAE) for semi-supervised classification using **TensorFlow/Keras** with **TensorBoard monitoring**.
- Achieved up to **98% accuracy** even with limited labeled data, demonstrating the effectiveness of semi-supervised learning in real experimental contexts.
- Reduced the need for time-consuming manual **labeling**, improving efficiency in large-scale data analysis for physics research.
- Strengthened skills in **data analysis, machine learning, deep learning, and signal processing**, bridging theoretical knowledge with practical applications in experimental physics.

Competences: Signal Processing · Machine Learning · Deep Learning · Semi-Supervised Learning · Python · RStudio · Data Analysis · Feature Engineering · Experimental Physics Applications · Statistical Analysis · Communication Skills · Research Methods

Università della Svizzera Italiana (USI)

City: Lugano | **Country:** Switzerland

[15/09/2025 – Current] **Teaching Assistant for Introduction to Data Science (MSc)**

• Supervise master statistics tutoring sessions of 10+ students.

• Solve statistics exercises with students, answering their questions and providing clear explanations.

• Monitor student progress and identify struggling students who could benefit from further support.

• Provide feedback to course coordinators on students' understanding of course material.

Competences: Data Science · Statistics · Teaching Skills · Python · Communication Skills

Alma Mater Studiorum - University of Bologna

City: Bologna | **Country:** Italy

[01/02/2025 – Current] **Tutor for Time Series in Statistics**

• Supervise undergraduate statistics tutoring sessions.

• Solve statistics exercises with students, answering their questions and providing clear explanations.

• Monitor student progress and identify struggling students who could benefit from further support.

• Provide feedback to course coordinators on students' understanding of course material.

Competences: Time Series · Data Science · Statistics · Teaching Skills · Rstudio Programming (including Ggplot2, Tidyverse) · Algorithms · Data Structures · Communication Skills

University of Glasgow https://www.gla.ac.uk/undergraduate/degrees/statistics/

City: Glasgow | **Country:** United Kingdom | **Name of unit or department:** Mathematics and Statistics | **Business or sector:** Education

[01/10/2023 – 15/06/2024]

Tutor for Statistics

• Supervise weekly undergraduate statistics tutoring sessions of 10+ students.

• Solve statistics exercises with students, answering their questions and providing clear explanations.

• Monitor student progress and identify struggling students who could benefit from further support.

• Provide feedback to course coordinators on students' understanding of course material.

Competences: Data Science · Statistics · Teaching Skills · Rstudio Programming (including Ggplot2, Tidyverse) · Algorithms · Data Structures · Communication Skills

University of Glasgow https://www.gla.ac.uk/undergraduate/degrees/statistics/

City: Glasgow | **Country:** United Kingdom | **Name of unit or department:** Mathematics and Statistics | **Business or sector:** Education

[01/10/2023 – 15/06/2024]

Lab Demonstrator for Statistics

- Supervise weekly undergraduate statistics lab sessions of 30+ students.
- Provide support for students within the lab using RStudio, answering student questions and providing clear explanations.
- Monitor student progress and identify struggling students who may benefit from further support.
- Provide the course coordinators with feedback on the students' understanding of the course material.

Competences: Data Science · Statistics · Teaching Skills · Rstudio Programming (including Ggplot2, Tidyverse) · Algorithms · Data Structures · Communication Skills

International School of Bologna

City: Bologna | **Country:** Italy

[09/2024 – 07/2025]

Mathematics Tutor

- Provide focused tutoring to Grade 12 students in advanced mathematics topics, including calculus, statistics, algebra, and trigonometry.
- Assist students in preparing for final exams, university entrance exams (such as the SAT) and the IB Mathematics exam.
- Customize lesson plans to address individual student weaknesses and reinforce key mathematical concepts.
- Support students in developing critical thinking and problem-solving skills necessary for higher education.
- Collaborate with teachers to monitor academic progress and adapt tutoring strategies based on student performance.

- Create a supportive and engaging learning environment, fostering confidence and a deeper understanding of complex mathematical theories.
- Integrate technology and digital resources to enhance learning and provide practice for mathematical challenges.

Competences: Teaching Skills · Communication Skills · Mathematics

EDUCATION AND TRAINING

[15/09/2024 – Current]

Master in Data Science

Alma Mater Studiorum, University of Bologna https://corsi.unibo.it/2cycle/StatisticalSciences/course-structure-diagram/piano/2024/9222/A91/000/2024

City: Bologna | **Country:** Italy | | **Level in EQF:** EQF level 7

[01/09/2025 – Current]

Master in Computational Science (Double Degree)

Università della Svizzera Italiana (USI) https://www.usi.ch/en/education/master/computational-science

City: Lugano | **Country:** Switzerland | | **Level in EQF:** EQF level 7

[09/2021 – 07/2024]

Bachelor in Statistical Sciences (Stats&Maths)

Alma Mater Studiorum, University of Bologna https://corsi.unibo.it/1cycle/StatsMaths

City: Bologna | **Country:** Italy | **Field(s) of study:** Natural sciences, mathematics and statistics: ● *Statistics* ● *Mathematics* | **Final grade:** 110 cum Laude | **Level in EQF:** EQF level 6 | **Thesis:** (Machine Learning) Dimension reduction: PCA and GPLVM for Simulated Cylinder and Real Handwritten Digits

[09/2023 – 06/2024]

Statistics BSc/MSci (Double Degree)

University of Glasgow https://corsi.unibo.it/1cycle/StatsMaths/opportunities-international-degree-programme

City: Glasgow | **Country:** United Kingdom | **Field(s) of study:** Natural sciences, mathematics and statistics: ● *Statistics* ● *Mathematics* | **Final grade:** First Class with Honours | **Level in EQF:** EQF level 6 | **Thesis:** (Machine Learning) Dimension reduction: PCA and GPLVM for Simulated Cylinder and Real Handwritten Digit

[09/2021 – Current]

Collegio Superiore of the University of Bologna (Honours Programme)

Alma Mater Studiorum, University of Bologna https://site.unibo.it/collegio-superiore/it

City: Bologna | | **Level in EQF:** EQF level 7

[09/2016 – 06/2021]

High School Diploma, Scientific International Curriculum

"Vito Volterra" High School https://www.liceovolterra.edu.it/

City: Ciampino (Rome) | **Country:** Italy | | **Final grade:** 100/100 | **Level in EQF:** EQF level 4

IGCSEs taken: English as a Second Language, Maths, Physics, Geography

CONFERENCES AND SEMINARS

[10/04/2024 – 13/04/2024]

Ruhlman Conference Wellesley College, Boston, Massachusetts, United States

During the conference I had the opportunity to share the results and experiences of my research, which investigates how the use of two different dimensionality reduction techniques (PCA and GPLVM), applied to a simulated dataset and a real dataset of handwritten digits, impacts on the quality of the latent spaces obtained.

One of the Ruhlman Conference's goals is promoting research through interdisciplinary collaboration of students and lecturers, to encourage the enrichment of the College intellectual life. The Conference had an international outlook. In fact, six other students and I were selected from universities all over the world.

Link: https://www1.wellesley.edu/ruhlman

[25/09/2024 – 26/09/2024] **Within-individual Variability Workshop** Uniersity of Cambridge, MRC Biostatistic Unit

In many biomedical applications, there is increasing interest in modelling within-individual variability of health measures recorded over time to characterise fluctuations around the mean trajectory. Simple summary statistics (like the standard deviation of the observation for each individual) do not account for the imbalance in the longitudinal observations across individuals and their time dependency, therefore statistical models for the within-individual variability are needed.

Some statistical models that can be used for the quantification of within-individual variability will be presented. The first session will be devoted to models for longitudinal data only, while the second will cover a basic introduction of joint modelling for longitudinal and time-to-event data, with an extension to within-individual variability.

The aim of the workshop is to gather statisticians, epidemiologists and data analysts interested in both methods and biomedical applications to discuss recent developments and future directions in modelling variability at the individual level.

The workshop will include talks from experts in longitudinal data analysis, flexible regression and joint modelling, working on the quantification of within-individual variability and its application in different biomedical fields.

PROJECTS

(Machine Learning) Dimension reduction: PCA and GPLVM for Simulated Cylinder and Real Handwritten Digits

The objective of this project is to perform dimensionality reduction firstly on a simulated dataset, and then on a real dataset of handwritten digits, obtaining a bi-dimensional latent space for the datasets, in order to provide an easier visualisation for the dataset by summarising it and keeping the majority of the information in a reduced space.

For the dimensionality reduction two methodologies will be compared: Principal Component Analysis (PCA) and Gaussian Process Latent Variable Models (GPLVM).

The final aim is to understand how the two different techniques behave in the case of the simulated dataset, and whether the difference in performance between the two remains constant or varies when considering the real dataset.

It will also be of interest to analyse how the theoretical properties of the two techniques will impact the analysis in practice, trying to understand which characteristics are best suited to the given context.

See the link for the complete report.

Link: https://ivancarnevali.github.io/files/Thesis.pdf

[15/05/2025 – 30/06/2025]

Does climate change exacerbate the existing economic and social differences between northern and southern Italy?

Conducted a data-driven research project on the **socioeconomic impacts of climate change in Italy**, focusing on regional **disparities between North and South**. Collected and preprocessed Eurostat, Copernicus, and ISTAT data, applied panel data and **mixed-effects models** with random effects to estimate the role of climatic variables on GDP per capita. Results highlighted how **climate change acts as a multiplier of existing inequalities**, disproportionately affecting southern regions.

[03/2025 – 07/2025]

Peer Mentor and Workshop Facilitator – MeMo Project (Collegio Superiore • University of Bologna • Merita Network • Scuola Superiore Sant'Anna)

- Completed a training module delivered by Scuola Superiore Sant'Anna on peer education, youth facilitation, and academic guidance.
- Co-designed and delivered two local workshops for high school students, focusing on post-graduation academic choices, motivation, and navigating uncertainty.
- Participated in the organization of a three-day residential internship involving 60 students from across Italy.
- Led thematic workshops on topics such as success and failure, expectations, and university life.
- Facilitated group discussions, reflective exercises, and team-building activities.
- Engaged with prominent speakers from the academic and public sphere, including Ilaria Capua and Matteo Marchesini.

Link: https://www.linkedin.com/posts/ivan-carnevali_memoproject-collegiosuperiore-mentorship-activity-7353399783950057472-YZxe?utm_source=share&utm_medium=member_desktop&rcm=ACoAADsJCxkBp5vJvQB_SFu8hmU0wo2lfYQ_FmI

[01/11/2023 – 01/12/2024]

Poster and Shiny App for Property Price Analysis in Portsmouth (UK)

Variables of interest (such as the total floor area, the postcode, the energy efficiency class and the year of sale) are used in order to investigate, after fitting a Generalized Additive Model (GAM), how the sale price is influenced by different properties of the houses. The analysis and the results are presented using an interactive Shiny App and a Poster.

Link: https://ivancarnevali.github.io/project/house-prices/

[01/09/2024 – 10/09/2024]

Creation of my personal website using RStudio and Hugo

Link: https://ivancarnevali.github.io/

[01/08/2024 – 01/09/2024]

Analysis of the rate of abortion and conscientious objection in Italy

Analysis of Italian legislation regarding abortion and conscientious objection from a comparative perspective, highlighting similarities and differences with other European states.

Data visualization of abortion and conscientious objection rates in order to obtain customized map charts using RStudio with ggplot2.

[01/12/2024 – 10/12/2024]

Bootstrap and Monte Carlo techniques for investigating properties of estimators

Analysis and report performed using R Markdown

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

English

LISTENING C2 **READING** C2 **WRITING** C2

SPOKEN PRODUCTION C2 **SPOKEN INTERACTION** C2

French

LISTENING B2 **READING** B2 **WRITING** B1

SPOKEN PRODUCTION B1 **SPOKEN INTERACTION** B1

German

LISTENING A1 **READING** A1 **WRITING** A1

SPOKEN PRODUCTION A1 **SPOKEN INTERACTION** A1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

SKILLS

R Studio/ R / R Markdown | Python | Shiny App | SAS | LaTex | Statistical Analysis | Machine Learning | Time Series modelling | Flourish - Data Visualization. | Video Editing | Adobe Photoshop, Canva, Adobe Illustrator | Microsoft Office

DRIVING LICENCE

Motorbikes:	AM	28/10/2020
Cars:	B	28/10/2020

HOBBIES AND INTERESTS

Sport

Competitive **swimming** (2012-2016),

semi-competitive **basket** (2016-2019) and **volleyball** (2019-2020)

Theatre and Musical theatre

(2013-2020)

Playing the piano

VOLUNTEERING

[06/2020 – 09/2020] **Animator summer centre** Ciampino (Rome)

COMMUNICATION AND INTERPERSONAL SKILLS

Soft skills

Time management

Team building and team working

Self motivation

Leadership

Communication

Decision making

Interpreting results