



UNIVERSITÀ DEGLI STUDI DI NAPOLI
FEDERICO II

itee_{PhD}
information technology
electrical engineering



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Enea Vincenzo Napolitano

Advanced Technologies for Sustainable Smart Cities

Tutor: Elio Masciari
Cycle: XXXVIII

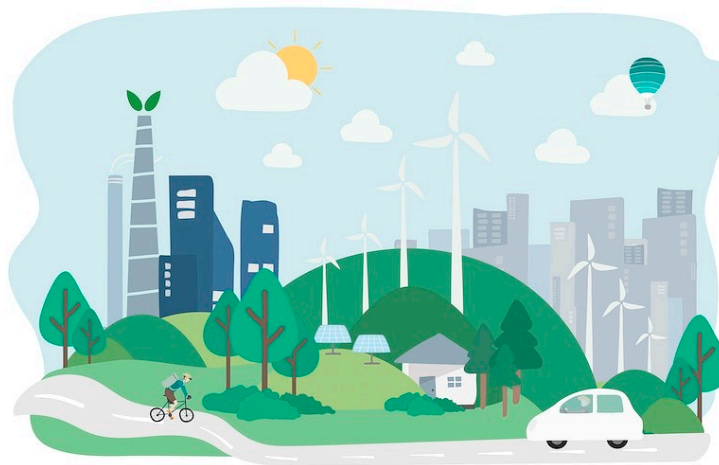
co-Tutor: Nicola Mazzocca
Year: 2022-23

My background

- M.Sc. in Data Science @Department of Physics - Federico II
- My research group is the PICUSLab @ DIETI
- I started my PhD on January 2023
- PNRR scholarship : RESTART

Research field of interest

Development of smarter and more environmentally friendly cities.



My focus is **analyze how people and things move around the city**, using data to improve transport and public services. The research will also provide ideas and strategies for planning future cities that are technologically advanced but also sustainable, with a **focus on the environment and the responsible use of new technologies**.

Research activities

- I studied the state-of-art about data-driven techniques for **spatio-temporal data** analysis of person and vehicles
 - Main topics: **Trajectory Mining**, Load Passenger Prediction
 - Secondary topics: Digital Twins, Smart Propagation Environment, Intelligent Reflecting Surfaces
- I explored the topic of estimating **greenhouse gas emissions** from ICT systems (in particular AI, HPC) by reviewing the literature.
- The development of a practical **digital transformation** project in the judicial offices of Naples to a concrete digitization process, providing an applicable model for improving efficiency and sustainability in public administration offices.

Courses attended

- I attended several ad-hoc courses useful for my research
 - Data Analysis
 - Using Deep Learning Properly
 - Statistical data analysis for science and engineering research
 - Advanced Telecommunications
 - IoT Data Analysis
 - Smart City
 - I Pilastri della Trasformazione Digitale
 - Scienza moderna e disciplina giuridica dell'Intelligenza Artificiale
 - Percorso per il rafforzamento delle competenze sulla progettazione europea
 - Soft skills
 - How to boost your PhD
 - Academic Entrepreneurship

Training activities

- **I took part two conferences**
 - **SEBD 2023**, 31st Symposium on Advanced Database Systems, Galzignano Terme (PD), Italy, 02-05/07/2023;
 - **ADBIS23**, 27th European Conference on Advances in Databases and Information Systems, Barcellona, Spain, 03-05/09/2023

- **I attended a PhD Summer School**
 - 16th International Summer School on Software Engineering (**ISSSE 2023**)

Research activity: Overview

- **Problem:**

- How can we make smart cities efficient and sustainable, especially in traffic management, through the introduction of new technologies?
- Can we reach a trade-off between AI model improvement and environmental cost?

- **Objective:**

- Survey of methods for the study of spatio-temporal data, both indoors and outdoors.
- Study of the environmental impact of AI models, the determinants factors of energy consumption, the techniques of consumption reduction; and the comparison between the main models

Research activity: Overview (2)

- **Methodology:**

Data Analysis and Data Mining:

- Trajectory Mining
- Analysis of Public Transport Passenger Data

Simulation and Digital Modelling:

- Digital Twins,
- Exploration of 5G

Assessing the environmental impact of technology:

- The environmental impact of advanced technologies

Products

[P1]	Napolitano, E. V. (2023, August). Intelligent technologies for urban progress: exploring the role of ai and advanced telecommunications in smart city evolution. In <i>European Conference on Advances in Databases and Information Systems</i> (pp. 676-683). Cham: Springer Nature Switzerland.
[P2]	Amato, F., Fioretto, S., Forgillo, E., Masciari, E., Mazzocca, N., Merola, S., & Napolitano, E. V. (2023, July). Evolving Justice Sector: An Innovative Proposal for Introducing AI-Based Techniques in Court Offices. In <i>International Conference on Electronic Government and the Information Systems Perspective</i> (pp. 75-88). Cham: Springer Nature Switzerland
[P3]	Napolitano, E. V. , Fioretto, S., Masciari, E., & Anniciello, A. (2023, May). How Pandemic Affected the Adoption of e-Health Systems. In <i>Proceedings of the 27th International Database Engineered Applications Symposium</i> (pp. 94-98).
[P4]	Napolitano, E. V. (2023). Trajectory Mining for Smart Cities: A Focus on Indoor Localization using 5G Technology. 31st Symposium on Advanced Database Systems
[P5]	Amato, F., Fioretto, S., Forgillo, E., Masciari, E., Mazzocca, N., Merola, S., & Napolitano, E. V. (2023). Introducing AI-Based Techniques in the Justice Sector: A Proposal for Digital Transformation of Court Offices. 31st Symposium on Advanced Database Systems

Next Year

- Application of Trajectory Mining with **indoor** data, using **5G-based localization** systems
- Use Trajectory Mining to create a framework that suggests paths in a way that has as little impact on the environment as possible.
- Create a **sustainability metric** that can indicate how important it is to improve the model to make it possible despite the emissions it produces.

Thanks for your attention

Any question?