Marco De Nadai | Ph.D.

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My research interests focus on Machine Learning and Computer Vision, particularly to the possibilities where Machine Learning can be applied to understand human behaviour. During my PhD, I studied how multi-modal data can be used to describe and predict people's activities in cities. To do so, I built predictive models that fuse structured data (e.g. tabular, geographic), images (e.g. satellite, Google Street View imagery) and GPS locations. Lately, I am also focusing on multi-domain and multi-modal image-to-image translation through GANs and VAEs.

Current position

2019 **Research scientist**, *Fondazione Bruno Kessler (FBK)*, Trento, Italy.
Computer vision models for multi-domain and multi-modal image to-image-translation, and prediction of real estate market values from urban aerial and Google Street View images.

Education

2015–2019 **PhD in Computer Science**, *University of Trento*, Italy, *cum laude*.
Thesis: *Into the City: a Multi-Disciplinary Investigation into Urban Life*
Advisors: Bruno Lepri and Nicu Sebe

2012–2015 **Master of Science in Computer Science**, *University of Trento*, Italy, *110/110 cum laude*.

2013-2014 **Exchange student in Artificial Intelligence**, *Vrije Universiteit Amsterdam*, Netherlands.

2008–2012 **Bachelor of Science in Computer Science**, *University of Udine*, Italy, *100/110*.

Work Experience

2018 Jun–Sep **Research scientist intern**, *Vodafone*, London, UK.
Developed a data-driven model for understanding and predicting the use of Android mobile applications and the mobility of people. Mined terabytes of logs and GPS locations. Apache Spark ETL.
Advisors: Nuria Oliver and Angelo Cardoso

2016 Jun–Sep **Visiting student - Research**, *Massachusetts Institute of Technology (MIT)*, Cambridge, MA, USA.
Developed a model to predict and describe crime from geographical, mobile phone and census data.
Advisor: Marta C. Gonzalez

2015 Mar–Nov **Data scientist**, *Fondazione Bruno Kessler (FBK)*, Trento, Italy.
Responsible for designing and developing models to predict human behaviour from multiple sources of data. Mining large scale data from mobile phone logs. Deep learning models for images processing.

2014–2015 **Data scientist intern - Research**, *Telecom Italia*, Trento, Italy.
Extracted and analyzed of large-scale data from mobile phone call logs to describe the mobility of people in cities.

2014 Mar–Sep **Machine Learning intern**, *University of Amsterdam*, Amsterdam, Netherlands.
Developed a Neural Network and ARIMA models to predict the energy consumption of buildings.

Skills

AI Machine Learning · Deep Learning · Computer Vision · Data Mining

Programming Python · SQL (especially PostgreSQL) · Java · C · PHP · Javascript

Framework NumPy · Scikit-learn · Pandas · PyTorch · Apache Spark · PostGIS · Stan · PyMC

Certifications DeepLearning.ai course · Scalable Machine Learning with Apache Spark

OS & Tools Linux · Bash · Git

Publications

2019 *Gesture-to-Gesture Translation in the Wild via Category-Independent Conditional Maps* — **ACM MM '19**
Y. Liu, **M. De Nadai**, G. Zen, N. Sebe and B. Lepri — arXiv:1907.05916

2019 *Strategies and limitations in app usage and human mobility* — **Nature Sci. Reports**
M. De Nadai, A. Cardoso, A. Lima, B. Lepri, and N. Oliver — arXiv:1904.09350

2019 *Precise mapping, density and spatial structure of all human settlements on Earth* — **Under review in Nature Communications**
E. Strano, F. Simini, **M. De Nadai**, T. Esch, and M. Marconcini

2018 *The economic value of neighborhoods: Predicting real estate prices from the urban environment* — **DSAA '18** doi:10.1109/DSAA.2018.00043
M. De Nadai and B. Lepri

2016 *Are safer looking neighborhoods more lively? a multimodal investigation into urban life* — **ACM MM '16** doi:10.1145/2964284.2964312
M. De Nadai, R. Vieriu, G. Zen, S. Dragicevic, N. Naik, M. Caraviello, C. A. Hidalgo, N. Sebe, and B. Lepri.

2016 *The death and life of great italian cities: A mobile phone data perspective* — **WWW '16** doi:10.1145/2872427.2883084
M. De Nadai, J. Staiano, R. Larcher, N. Sebe, D. Quercia, and B. Lepri

2016 *The mobile territorial lab: A multilayered and dynamic view on parents' daily lives* — **EPJ Data Science** doi:10.1140/epjds/s13688-016-0064-6
S. Centellegher, **M. De Nadai**, M. Caraviello, C. Leonardi, M. Vescovi, Y. Ramadian, N. Oliver, F. Pianesi, A. Pentland, F. Antonelli, and B. Lepri.

2015 *A multi-source dataset of urban life in the city of milan and the province of trentino* — **Nature Scientific Data** doi:10.1038/sdata.2015.55
G. Barlacchi, **M. De Nadai**, R. Larcher, A. Casella, C. Chitic, G. Torrisi, F. Antonelli, A. Vespignani, A. Pentland, and B. Lepri

2015 *Short-term anomaly detection in gas consumption through arima and artificial neural network forecast* — **IEEE EESMS '15** doi:10.1109/EESMS.2015.7175886
M. De Nadai and M. van Someren

Projects

2019 **Text controlled Image-to-Image translation**, *Ongoing work*.
Image-to-image translation model where the translation is controlled through a free-text written by the user.

2019 **Generative models for human mobility**, *Ongoing work*.
Generative model based on Wavenet and Variational Auto-Encoders (VAEs) to generate synthetic GPS locations.

2019 **Generative Adversarial Networks (GANs) for urban spaces**, *Ongoing work*.
Designed a GAN model to propose *what* and *where* a Point of Interest can be added to a neighborhood, conditionally to the aerial image (e.g. satellite or maps) describing it.

2018 **Prediction of people's activity and real estate prices**, *Industrial work*.
Developed and implemented a predictive model to predict housing prices from structured data and Google Street View images. Deployed in production in multiple cities.

2017 **Data fusion of GIS, mobile phone, and census to predict crime**, *Ongoing work*.
Developed a MCMC Bayesian regression model to explore and predict geo-located crime from structured data and matrices of people's movements between urban areas. Deployed in five cities.

Awards

2017 **Microsoft Azure Research Award.** Azure cloud credits for my research. *€20,000.00*

2017 **1st Place.** Italian Football Federation Match Analysis competition. *€5,000.00*

2017 **Travel and Accomodation Grant.** Computational Social Science Summer school.

2016 **Travel Grant.** ACM grant for the Multimedia 2016 conference.

2016 **Travel Grant.** Google grant for the WWW 2016 conference.

2016 **Best Master student.** University of Trento.

Other activities

PC member — ECAI 2020 · ACM MM 2019 · ICDCS 2018 · DAPS 2017

Reviewer — KDD 2018-2019 · Ubicomp · Plos one · EPJ Data Science · DAMI · JOSIS · GeoJournal

S. Schools — Computational Social Science Summer school (2017) *Sant'Antioco, Italy*

Complex networks: theory, methods, and applications (2017) *Como, Italy*

Languages

English — Full professional proficiency (C1)

Italian — Native

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