Nicola Pezzotti
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Computer science and programming skills
Python
C++
Algorithmics
Deep Learning
Machine Learning
GPGPU
JavaScript
TypeScript
OpenGL
Linux Development
Windows Development
Arduino

Website
nicola17.github.io

Date of birth
17/06/1986

Nationality
Italian

Languages
Italian
English

References
Prof.dr. M. Petkovic
Philips Research
TU Eindhoven
milan.petkovic@philips.com

Prof.dr. A. Vilanova
TU Eindhoven
a.vilanova@tudelft.nl

Prof.dr.ir. B. Lelieveldt
Leiden University Medical Center
b.p.f.Lelieveldt@lumc.nl

Dr. L. van der Maaten
Facebook AI Research
lvdmaaten@gmail.com

Hobbies
Long distance running:
11 marathons,
2 sky-marathons
and a 100km race.
Reading
Gaming

Nicola Pezzotti

Professional experience

Senior Scientist and Project Lead, Philips Research, The Netherlands
November 2018 - Present
I lead several activities in Philips Research, bringing machine-learning to different business units and defining, leading and executing critical projects on data and artificial intelligence.
Highlights:
- Shaped and lead the team that **won the fastMRI challenge**, organized by **Facebook AI Research and NYU Langone Health** at **NeurIPS** 2019, demonstrating the power of deep-learning reducing MRI scan time.
- Drove the team that translated the victory in the challenge into the **SmartSpeed product** in two years, including FDA approval. Projected **revenue of $280M in 6 years**. Led the development of two extra deep-learning based products expected to be announced in 2022 and 2023.
- In the lead of two of the biggest data acquisition campaigns in Philips in the domain of MRI and Ultrasound, handling dozen of millions of imaging data.
- Leading the team bringing the first deep-learning product to cardiovascular ultrasound in Philips.
- Several thought-leadership activities, including many presentations (e.g., invited talk at ML4H at NeurIPS) and published papers.

Assistant Professor, TU Eindhoven, The Netherlands
February 2020 - Present
Part-time appointment at the department of Mathematics and Computer Science at the Technical University of Eindhoven. Driving several research activities in the Netherlands, including a large research lab in collaboration with Leiden University Medical Center
Highlights:
- Supervision of **2 PhDs** in robust artificial intelligence and AI-driven 3D reconstruction.
- Scientific Director for the AI4MRI lab at LUMC, responsible for the research line and supervision of **6 PhD** students. Acquired **€2.4M in public funding** for financing the lab through the ROBUST AI program.
- Member of the User Committee for the ROBUST AI program, overseeing 17 labs with 87M of budget in private-public partnership.

Research Intern, Google AI, Switzerland
February 2018 - May 2018
I worked with Alexander Mordvintsev, the creator of Google's DeepDream, on the interpretability of Deep Neural Networks and their generative capabilities.
Highlights:
- Two research papers published, as well as a Google AI research blog post.
- My work featured in the **best research effort for Google AI** in 2018.
- Proposed and released a tSNE optimization framework in **TensorBoard.js**.
- Passed the conversion interview and offered a full-time position.

Visiting Researcher, INRIA Project Team AVIZ, France
April 2017 - June 2017
I worked with professor Jean-Daniel Fekete on the Progressive Visual Analytics paradigm for the analysis of extremely large data collections. This work powered analytics systems for the detection of rare cell-types as well, analysis of deep learning models and exploration of large graphs.

PhD cum Laude, Delft University of Technology, The Netherlands
September 2014 - October 2018
My research consists in the development of scalable dimensionality-reduction algorithms for the analysis of extremely large data, such as single-cell datasets, medical imaging data, social networks, text corpora, graphs and deep neural networks.
Highlights:
- 15+ papers published only in top-tier venues, **7 as first author**.
- Lead to the discovery of previously **unknown cell-types** associated with auto-immune diseases.
- Received the PhD Cum Laude, awarded to only **5% of students** in the Netherlands.
- Received **several awards**, including IEEE VGTC Best Dissertation Award, TU Delft Excellence in Research, and the Dirk Bartz Prize for Visual Computing in Medicine.

Research & Development Engineer, Open Technologies S.R.L, Italy
July 2011 - August 2014
In charge of the development of the high-end real-time scanner *Insight3* and the computational geometry library. Technology excellence led to the company being acquired by the USA company FARO.
Highlights:
- Developed Insight3, including SW, HW and electronics.
- Developed several computational geometry algorithms that gave the company an edge over the competition and led to its acquisition. Some of them are published in research papers.
- One year part-time position as a research fellow at the University of Brescia.

Freelance Developer, Italy
1999 - 2011
Developed several systems and SW projects, including an optimization algorithm for the design of steel pulleys (at age 13), a real-time control system for plastic injection-moulding, a GSM-based alert system for volunteer fire workers and several web-based systems.

Education

MSc in Computer Science & Engineering, University of Brescia, Italy

2009-2011

For my master thesis I worked on the development of fast and automatic tools for the alignment of 3D data such as point clouds, meshes and range images. This work was done in collaboration with the company Open Technologies S.R.L. where I interned for 6 months.
I graduated with a final grade of 110/110.

BSc in Information Engineering, University of Brescia, Italy

2005-2009

For my bachelor thesis I developed a library for interprocess communication between real-time applications working in Linux-Xenomai and other Linux applications. This work was done in collaboration with the company G2L S.R.L. where I interned for 6 months.

Awards

Philips Innovation Award - 2021
For the work done on improving image quality of MRI images using deep-learning techniques.

IEEE CoG Bot Bowl III Competition Winner and Best ML Method - 2021
Development of the first and only machine learning bot, based on reinforcement and imitation learning, able to compete in Blood Bowl.

Philips Innovation Award - 2020
For the work done in translating the victory in the fastMRI challenge into a Philips product and for the creation of the machine learning tooling now powering new developments in Philips.

Philips Outstanding Achievement Award - 2020
For the scientific results in applying AI technology to improve the MRI systems, as well as accelerating AI propositions in the company through scientific and engineering efforts.

Winner of the first FastMRI Challenge, December - 2019
I led the AI development for the "Philips&LUMC" team that won the multi-coil tracks of the FastMRI challenge. I represented the team at NeurIPS 2019.

IEEE VGTC VPG, Best Doctoral Dissertation Award - 2019
Best Dissertation Award for year 2019.

Dirk Bartz Prize for Visual Computing in Medicine - 2019
Awarded at Eurographics 2019.

Portraits of Science, December - 2018
TU Delft Excellence in Research 2018.

Silver Medal, Italian Olympiad in Informatics, March - 2005
Italian selection for the International Olympiad in Informatics (IOI).

Featured Publications

An adaptive intelligence algorithm for undersampled knee MRI reconstruction
N. Pezzotti et al.
IEEE Access 2020

GPGPU Linear Complexity t-SNE Optimization
N. Pezzotti, J. Thijssen, A. Mordvintsev, T. Höllt, B. van Lew, B. Lelieveldt, E. Eisemann, A. Vilanova
Transaction on Visualization and Computer Graphics, Proc. of IEEE VIS 2019, Google AI Blog 2018 and best Google AI research effort in 2018

Hierarchical Stochastic Neighbor Embedding
N. Pezzotti, T. Höllt, B. Lelieveldt, E. Eisemann, A. Vilanova
Computer Graphics Forum, Proceedings of EuroVIS 2016

DeepEyes: Progressive Visual Analytics for Designing Deep Neural Networks
N. Pezzotti, T. Höllt, J. van Gemert, B. Lelieveldt, E. Eisemann, A. Vilanova
Transaction on Visualization and Computer Graphics, Proc. of IEEE VIS 2017

Approximated and User Steerable tSNE for Progressive Visual Analytics
N. Pezzotti, B. Lelieveldt, L. van der Maaten, T. Höllt, E. Eisemann, A. Vilanova
Transaction on Visualization and Computer Graphics, Presented at IEEE VIS 2016

Differentiable Image Parameterizations
A. Mordvintsev, N. Pezzotti, L. Schubert, C. Olah
Distill.pub 2018,
Interactive Journal for Machine Learning Interpretation.

Interactive Visual Analysis of Mass Cytometry Data by Hierarchical Stochastic Neighbor Embedding Reveals Rare Cell Types
V. van Unen*, T. Höllt*, N. Pezzotti* et al.
Nature Communications 2017

Poisson-driven seamless completion of triangular meshes
M. Centin, N. Pezzotti, A. Signoroni
Computer Aided Geometric Design 2015

Other Publications

The Transform-and-Perform framework: Explainable deep learning beyond classification
V. Prasad, R. van Sloun, S. van den Elzen, A. Vilanova, N. Pezzotti
IEEE Transactions on Visualization and Computer Graphics 2022

Maximizing Segmentation Quality of Under-sampled Motion Corrupted Cardiac Cine-MRI Using an End-to-End Deep Learning Model
A. Adly, R. van Sloun, K. Hammernik, J. Caballero, D. Rueckert, N. Pezzotti
Medical Imaging with Deep Learning 2022

The effect of intra-scan motion on AI reconstructions in MRI
L. Beljaards, N. Pezzotti, C. Schülke, M.J.P. van Osch, M. Staring
Medical Imaging with Deep Learning 2022

Image Quality Assessment for Magnetic Resonance Imaging
S. Kastryulin, J. Zakirov, N. Pezzotti, D.V. Dylov
arXiv 2022

Generating High-Resolution 3D Faces Using VQ-VAE-2 with PixelSNAIL Networks
A. Gallucci, D. Znamenskiy, N. Pezzotti, M. Petkovic
International Conference on Image Analysis and Processing 2022

Evaluation of the robustness of learned MR image reconstruction to systematic deviations between training and test data for the models from the fastMRI challenge
P. Johnson et al.
International Workshop on Machine Learning for Medical Image Reconstruction 2021

MimicBot: Combining Imitation and Reinforcement Learning to win in Bot Bowl
N. Pezzotti
arXiv 2021

Learning to Predict Error for MRI Reconstruction
S. Hu, N. Pezzotti, M. Welling
Medical Image Computing and Computer Assisted Intervention 2021

Systems analysis and controlled malaria infection in Europeans and Africans elucidate naturally acquired immunity
S. de Jong ... N. Pezzotti et al.
Nature Immunology 2021

Active Deep Probabilistic Subsampling
H. van Gorp, I. Huijben, B. Veeling, N. Pezzotti, R. van Sloun
International Conference on Machine Learning 2021

A latent space exploration for microscopic skin lesion augmentations with VQ-VAE-2 and PixelSNAIL
A. Gallucci, N. Pezzotti, D. Znamenskiy, M. Petkovic
Journal of Medical Imaging 2021

Don't Tear Your Hair Out: Analysis of the Impact of Skin Hair on the Diagnosis of Microscopic Skin Lesions
A. Gallucci, D. Znamenskiy, N. Pezzotti, M. Petkovic
International Conference on Pattern Recognition Workshops 2020

Comparative analysis of magnetic resonance fingerprinting dictionaries via dimensionality reduction
O. Dzyubachyk, K. Koolstra, N. Pezzotti, B. Lelieveldt, A. Webb, P. Börnert
International Workshop on Graph Learning in Medical Imaging 2019

Focus+Context Exploration of Hierarchical Embeddings
T. Höllt, A. Vilanova, N. Pezzotti, B. Lelieveldt, H. Hauser, A. Vilanova
Computer Graphics Forum 2018

Progressive data science: Potential and challenges
C. Turkay, N. Pezzotti et al.
ArXiV 2018

Heterogeneity of circulating CD8 T-cells specific to islet, neo-antigen and virus in patients with type 1 diabetes mellitus
S. Laban et al.
PlosOne 2018

Multiscale Visualization and Exploration of Large Bipartite Graphs
N. Pezzotti, J.D. Fekete, T. Höllt, B. Lelieveldt, E. Eisemann, A. Vilanova
Computer Graphics Forum 2018

Mass Cytometry Reveals Innate Lymphoid Cell Differentiation Pathways in the Human Fetal Intestine
N. Li et al.
Journal of Experimental Medicine 2018

Interactive Visual Exploration of 3D Mass Spectrometry Imaging Data Using Hierarchical Stochastic Neighbor Embedding Reveals Spatiomolecular Structures at Full Data Resolution
W. M. Abdelmoula, N. Pezzotti, T. Hölt, J. Dijkstra, A. Vilanova, L. A McDonnell, B. Lelieveldt
Journal of Proteome Research 2018

CyteGuide: Visual Guidance for Hierarchical Single-Cell Analysis
T. Höllt, N. Pezzotti, V. van Unen, F. Koning, B. Lelieveldt, A. Vilanova
Transaction on Visualization and Computer Graphics, Proc. of IEEE VIS 2017

BrainScope: Interactive Visual Exploration of the Spatial and Temporal Human Brain Transcriptome
S. Huisman, B. van Lew, A. Mahfouz, N. Pezzotti, T. Höllt, L. Michielsen, A. Vilanova, M. JT Reinders, B. Lelieveldt
Nucleic Acids Research 2017

Employing Visual Analytics to Aid the Design of White Matter Hyperintensity Classifiers
R. Raidou, H. Kuijf, N. Sepasian, N. Pezzotti, W. Bouvy, M. Breeuwer, A. Vilanova
International Conference on Medical Image Computing and Computer-Assisted Intervention 2016

Cytosplore: Interactive Immune Cell Phenotyping for Large Single-Cell Datasets
T. Höllt, N. Pezzotti, V. van Unen, F. Koning, E. Eisemann, B. Lelieveldt, A. Vilanova
Computer Graphics Forum, Proceedings of EuroVIS 2016

Poisson-Driven Seamless Completion of Triangular Meshes
M. Centin, N. Pezzotti, A. Signoroni
Computer Aided Geometric Design 2015

On-the-Fly Automatic Alignment and Global Registration of Free-Path Collected 3D Scans
F. Bonarrigo, N. Pezzotti, A. Signoroni
Digital Heritage International Congress 2013

Boosting the Computational Performance of Feature-Based Multiple 3D Scan Alignment by IAT-k-Means Clustering
N. Pezzotti, F. Bonarrigo, A. Signoroni
3D Imaging, Modeling, Processing, Visualization and Transmission 2012