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

Website
nicola17.github.io

Address
Gagelboschplein 535
5654KX Eindhoven
The Netherlands

Date of birth
17/06/1986

Nationality
Italian

Languages
Italian
English

References
Dr. A. Vilanova
Delft University of Technology
a.vilanova@tudelft.nl

Prof.dr.ir. B. Lelieveldt
Leiden University Medical Center
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Prof.dr. M. Petkovic
Philips Research
TU Eindhoven
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Nicola Pezzotti

About Me I was 13 years old when I started coding and I could never stop. I enjoy writing code that is scalable and solves real-world problems.

Professional experience

Research Scientist, Philips Research, The Netherlands
November 2018 - Present
As a research scientist in Artificial Intelligence, I lead the development of machine learning solutions for image formation in MRI. Among the other duties, I set up two research teams in collaborations with academic institutions. The first one, in which I acted as tech and project lead, is a collaboration between Philips and the LUMC, while the second is a includes UvA, AMC, NKI and Philips Research.

Research Intern, Google AI, Switzerland
February 2018 - May 2018
I worked with Alexander Mordvintsev, the creator of Google's DeepDream project, on the interpretability of Deep Neural Networks. I published two research papers and I developed a new manifold-learning approach that I released in TensorFlow.js and featured on the Google AI blog and on the top research efforts of Google AI in 2018.

Visiting Researcher, INRIA Project Team AVIZ, France
April 2017 - June 2017
I worked with professor Jean-Daniel Fekete on the development of the Progressive Visual Analytics paradigm for the analysis of large data collections. This work powered analytics system for the analysis of deep learning models and large networks.

PhD cum Laude, Delft University of Technology, The Netherlands
September 2014 - October 2018
My research consists in the development of scalable manifold-learning algorithms for the analysis of extremely large data, such as medical datasets, social-networks, text corpora and deep neural networks. My algorithms and systems were presented in the most important visual analytics venues and are used by medical researchers for the analysis of real-world data. Thanks to the Hierarchical Stochastic Neighbor Embedding (HSNE) algorithm that I developed, we were able to identify previously unknown immune-system cell types. This result was achieved by scaling up the number of cells that could be analyzed with a manifold-learning algorithm from a few thousands to several millions. HSNE is also the cornerstone for DeepEyes, a system for the visual analysis of deep neural networks during training that I developed. My algorithms are mainly implemented in C++ and are released as part of the High-Dimensional-Inspector library.

Research & Development Engineer, Open Technologies S.R.L, Italy
July 2011 - August 2014
I was responsible of the development of the high-end real-time scanner *Insight3* I optimized the algorithms developed during my Research Fellowship and developed several Arduino-based systems for the on-board control of *Insight3*. Furthermore, I contributed to the development of the computational-geometry module of the Open Technologies S.R.L. proprietary library and I was in charge of the control versioning and the release of the company's main software.

Research Fellow, University of Brescia, Italy
September 2011 - August 2012
I developed proprietary algorithms for the real-time computation of implicit surfaces on the GPU. These algorithms are designed to work with off-the-shelf and real-time scanning devices like the Microsoft Kinect and the PrimeSense Carmine and Capri. Furthermore, I devised a proprietary passive stereo system that led to the development of the *Insight3* high-quality real-time scanner. Due to the strict real-time requirements all the developed algorithms were implemented in C++, CUDA and Thrust.

Awards

Winner of the first FastMRI Challenge
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, October 2019
Best Dissertation Award for year 2019 (to be awarded at IEEE VIS 2019).

Dirk Bartz Prize for Visual Computing in Medicine, March 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).

Education

MSc in Computer Science, 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.

Personal interests

Long-distance running, cycling, board gaming, reading, coding competitions, traveling.

Featured Publications

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

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 and Google AI Blog 2018

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

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

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

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

Program Committee

Innovative Applications of Artificial Intelligence 2020 (IAAI-20)
Applied AI research program within the AAAI National Conference

Smart Tools and Applications in Graphics 2018
Eurographics Italian Chapter with a focus on Machine Learning for Graphics

Review Service

Conference on Computer-Human Interaction (ACM CHI) 2019
Premier international conference of Human-Computer Interaction.

IEEE Transaction on Visualization and Computer Graphics (IEEE TVCG) 2018, 2019
Most important journal on the topics of visualization and computer graphics.

IEEE VIS 2017, 2018, 2019
Worldwide largest and most important conference on Scientific Visualization, Information Visualization and Visual Analytics.

Neural Networks 2019
Neural Networks is a monthly peer-reviewed scientific journal and an official journal of the International Neural Network Society.

International Conference on 3D Vision 2018
International conference on 3D research, computer vision and graphics.

Smart Tools and Applications in Graphics 2018
Eurographics Italian Chapter with a focus on Machine Learning for Graphics

EuroVis 2018, 2019
European conference on Scientific Visualization, Information Visualization and Visual Analytics.

Dagstuhl Seminars

Dagstuhl seminars are invitation-only events where world leading computer scientists gather to brainstorm on hot topics and technologies in computer science.

Progressive Data Analysis and Visualization - October 2018
Seminar on large scale information retrieval and analysis with a focus on artificial intelligence.

Tutorial

Blending Visualization with Data Mining and Machine Learning for Biomedical Data Analysis 2018
Topic: *Visual Analytics from Feature Design to Deep Neural Networks Understanding*
International Conference On Medical Image Computing and Computer Assisted Intervention (MICCAI)

Other Publications

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