



## ELENA MOROTTI

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[elena.morotti1988@gmail.com](mailto:elena.morotti1988@gmail.com)

**Junior assistant professor (fixed-term)**  
Department of Political and Social Sciences  
Academic discipline: MAT/08 Numerical Analysis

### EDUCATION

January 2014 -  
January 2018

**Phd in Computational Mathematics**  
University of Padua, Italy  
Supervised by Professor Elena Loli Piccolomini

**Project:**

My doctoral research focuses on the study and the application of optimization algorithms for the reconstruction of 3D medical breast images from few tomographic real data. Mathematically, the breast tomosynthesis problem is an underdetermined linear system of huge size and it is solved with a regularization item. A good solver must be able to reduce CT artifacts and also feasible to be implemented in parallel on commercial softwares. I am writing a commercial-like program, running on GPUs, to test first-order methods on real data.

**Thesis:**

Title: "Reconstruction of 3D X-ray tomographic images from sparse data with TV-based methods"  
Submission: 28th October 2017  
Discussed: 1st March 2018

Maternity leave: July - December 2014

October 2010 -  
February 2013

**Master degree in Applied Mathematics**  
110/110 cum laude  
Mathematics Department, University of Bologna, Italy.

**Thesis title:**

"Tecniche di regolarizzazione per analisi perfusionali da immagini tomografiche" ("Regularization techniques for perfusion analysis from tomographic images")  
Supervised by Professor Elena Loli Piccolomini .

September 2007 - **Bachelor degree in Mathematics**  
October 2010 110/110  
Mathematics Department, University of Bologna, Italy.  
**Thesis title:**  
“Metodi numerici per la segmentazione di immagini digitali”  
Supervised by Professor Elena Loli Piccolomini

June 2007 **Scientific high school degree**  
100/100  
Liceo Scientifico Statale Rambaldi-Valeriani, Imola, BO, Italy.

## **WORK EXPERIENCE**

February 2013 - Analyst programmer  
February 2014 IMS S.r.l - Internazionale Medico Scientifica (<http://www.imsitaly.eu> )  
Sasso Marconi, BO, Italy.  
**Project:** research, development and test of algorithms to implement 3D-mammographic instruments, through the solution of linear system with regularization techniques.

February - March 2018 Collaboration with the Department of Computer Science and Engineering, University of Bologna, Italy.  
**Project:**  
“Sviluppo e implementazione di algoritmi efficienti per la ricostruzione di immagini, nell’ambito del Progetto di realizzazione di ambienti di realtà virtuale e realtà aumentata immersiva”.

May 2018 - Research fellow  
October 2020 Department of Computer Science and Engineering, University of Bologna, Italy.  
**Project:**  
“Sviluppo e implementazione di algoritmi efficienti per la ricostruzione di immagini e realizzazione di applicazioni di realtà virtuale immersiva”.

Maternity leave: June - November 2018

July 2021 - Junior assistant professor (fixed-term)  
present Department of Political and Social Sciences, University of Bologna, Italy.

## **SKILLS**

Programming Languages C, Matlab, R, Python Mathematica, Unity 3d

Languages	English, basic spoken French
Miscellaneous	Project management, Team coordination, Software development, Data Analysis, Problem Solving

## **SCIENTIFIC RESEARCH**

### **Interests**

- Image reconstruction, Computed Tomography, Medical Imaging, Inverse Problems;
- Optimization, Variational Methods, Deep Learning, Neural Networks;
- Data Mining, Data Visualization, Virtual Reality.

### **Publications**

1. Piccolomini, E. L., & Morotti, E. (2016). A fast total variation-based iterative algorithm for digital breast tomosynthesis image reconstruction. *Journal of Algorithms & Computational Technology*, 10(4), 277-289.  
doi: [10.1177/1748301816668022](https://doi.org/10.1177/1748301816668022)
2. Coli, V. L., Piccolomini, E. L., Morotti, E., & Zanni, L. (2017, October). A fast gradient projection method for 3D image reconstruction from limited tomographic data. In *Journal of Physics: Conference Series* (Vol. 904, No. 1, p. 012013). IOP Publishing.  
doi: [10.1088/1742-6596/904/1/012013](https://doi.org/10.1088/1742-6596/904/1/012013)
3. Piccolomini, E. L., Coli, V. L., Morotti, E., & Zanni, L. (2018). Reconstruction of 3D X-ray CT images from reduced sampling by a scaled gradient projection algorithm. *Computational Optimization and Applications*, 71(1), 171-191.  
doi: <https://doi.org/10.1007/s10589-017-9961-2>
4. Morotti, E. (2018). Reconstruction of 3D X-ray tomographic images from sparse data with TV-based methods. *Ph.D. thesis*.  
Scaricabile da <http://paduaresearch.cab.unipd.it/11215/>
5. Donatiello, L., Morotti, E., Marfia, G., & Di Vaio, S. (2018, September). Exploiting Immersive Virtual Reality for Fashion Gamification. In *2018 IEEE 29th Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)* (pp. 17-21). IEEE.  
doi: <http://dx.doi.org/10.1109/PIMRC.2018.8581036>
6. Cavicchioli, R., Hu, J. C., Piccolomini, E. L., Morotti, E., & Zanni, L. (2020). GPU acceleration of a model-based iterative method for Digital Breast Tomosynthesis. *Scientific Reports*, 10(1), 1-10.

doi: <http://dx.doi.org/10.1038/s41598-019-56920-y>

7. Morotti, E., Donatiello, L., & Marfia, G. (2020, March). Fostering fashion retail experiences through virtual reality and voice assistants. In *2020 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)* (pp. 338-342). IEEE.  
doi: <http://dx.doi.org/10.1109/VRW50115.2020.00074>
8. Piccolomini, E. L., & Morotti, E. (2021). A Model-Based Optimization Framework for Iterative Digital Breast Tomosynthesis Image Reconstruction. *Journal of Imaging*, 7(2), 36.  
doi: <https://doi.org/10.3390/jimaging7020036>
9. Morotti, E., Evangelista, D., & Loli Piccolomini, E. (2021). A Green Prospective for Learned Post-Processing in Sparse-View Tomographic Reconstruction. *Journal of Imaging*, 7(8), 139.  
doi: <https://doi.org/10.3390/jimaging7080139>
10. Morotti, E., Stacchio, L., Donatiello, L., Roccetti, M., Tarabelli, J., & Marfia, G. (2021). Exploiting fashion x-commerce through the empowerment of voice in the fashion virtual reality arena. *Virtual Reality*, 1-14.  
doi: <https://doi.org/10.1007/s10055-021-00602-6>
11. Cascarano, Pasquale, Elena Loli Piccolomini, Elena Morotti, and Andrea Sebastiani. "Plug-and-Play external and internal priors for image restoration." *arXiv preprint arXiv:2102.07510* (2021).

## **PROJECTS**

- GNCS 2015: "Nuovi aspetti della regolarizzazione nell'imaging", by Elena Loli Piccolomini, Università di Bologna.
- GNCS 2016: "Nuovi aspetti della regolarizzazione nell'imaging", by Marco Prato, Università degli studi di Modena e Reggio Emilia.
- GNCS 2017: "Metodi numerici non lineari per problemi inversi e applicazioni", by Claudio Estatico, Università degli studi di Genova.
- GNCS 2018: "Metodi di ottimizzazione stocastica per problemi di apprendimento automatico a larga scala", by Luca Zanni, Università degli studi di Modena e Reggio Emilia.
- GNCS 2019: "Tecniche adattive per metodi di ottimizzazione in Machine Learning", by Stefania Bellavia, Università di Firenze.
- GNCS 2020: "Ottimizzazione per l'apprendimento automatico e apprendimento automatico per l'ottimizzazione", by Federica Porta, Università degli studi di Modena e Reggio Emilia.

## **RESEARCH GROUPS**

- “OASIS - Optimization Algorithms and Software for Inverse problemS”  
<http://www.oasis.unimore.it/site/home.html>  
2016 - present
- “CFC - Culture Fashion Communication”, international research center  
<https://centri.unibo.it/culturefashioncommunication/en>  
2019 - 2020
- UnaEuropa Project (prof. Siltanen - Università di Helsinki, prof. Gondzio - Università di Edinburgo, prof.ssa Sgallari - Università di Bologna)  
2020 - present
- “UMI-MIVA” - UMI group of “Matematica delle Immagini, della Visione e delle loro Applicazioni”  
<https://umi.dm.unibo.it/gruppi-umi-2/gruppo-umi-miva/>  
2020 - present
- “PREDICT - The future of Prediction”  
<https://www.uni-bielefeld.de/fakultaeten/soziologie/forschung/projekte/predict/index.xml>  
2021 - present

## **SCIENTIFIC COLLABORATIONS**

- Finnish Inverse Problem Society, at the Department of Mathematics and Statistics (<https://www.fips.fi/>), University of Helsinki, under the scientific supervision of prof. Samuli Siltanen.  
Since January 2017
- Department of Developmental Psychology at University of Padua (under the scientific supervision of prof. Teresa Farroni).  
2019 - 2020

## **COLLABORATIONS WITH COMPANIES**

- IMS - Internazionale Medico Scientifica Giotto S.P.A. (<http://www.msgiotto.com/>)  
Since May 2013
- EON Reality Italia S.r.l  
October 2018 - December 2019

## **ACADEMIC ACTIVITIES**

- Reviewer for international journal, since 2019: “Sensors” by MDPI and “Medical Image Analysis” by Elsevier.

- Co-organizer of the mini-symposium “Continuous optimization techniques for image processing applications”, during the FGS'2019 - 19th French-German-Swiss conference on Optimization, 17-20 September 2019, Nice (France).
- Co-organizer of the mini-symposium ““Deep learning for tomographic image reconstruction”, during the SIAM Conference on Imaging Science 2022, 21-25 March 2022, Berlin (German).

Bologna, 20/12/2021

*Eleonora Morotti*

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