



Chiara Razzetta

Curriculum Vitae

Contacts

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Research Interests

- Inverse Problems
- Optimization Theory
- Image Processing
- Machine Learning
- Medical Imaging

Current Position

11/2020-10/2023 **PhD candidate in Mathematics and Applications**, *University of Genoa*, Genova, Supervisors: Prof. Federico Benvenuto, Marco Crocco Ph.D.

The scholarship is financed by Esaote S.p.A. and carried out in collaboration with Esaote R&D Advanced Applications group on:

- Ultrasound signal beamforming algorithms for image reconstruction
- Stochastic optimization for acquisition parameters tuning and for image quality enhancement
- Neural Networks for acquisition parameter prediction

Education

1 March 2018 - 27 May 2020 **Master's Degree in Applied Mathematics**, *University of Genoa*, Genova, Thesis: *Il problema inverso dell'imaging biomedicale a ultrasuoni: dalla teoria alla simulazione numerica*. Grade: 110/110 cum Laude

Supervisors: Prof. Federico Benvenuto, Marco Crocco Ph.D.

15 September **Bachelor Degree in Mathematics**, *University of Genoa*, Genova, Thesis: *Branching Process discreto: estinzione e mutazione di una popolazione di cellule*. Grade: 97/110
March 2018

Supervisor: Prof. Veronica Umanità

Attended specialization courses

June 2022 **14th IEEE EMBS-SPS International Summer School on Biomedical Imaging**, *IMT Atlantique Bretagne-Pays de la Loire*

- Recent advances in acquisition and reconstruction for accelerated MRI
- Machine Learning for Medical Images
- Assessing Cellular Morphology and Tissue Architecture
- Inverse Problem in Fluorescent Microscopy and Super-Resolution

February 2021 **TraDE-OPT Winter School on Convex Optimization**, *virtually hosted at TU Braunschweig*

- Convex Analysis
- Convex Optimization Algorithms

March 2020 - June 2020 **Certificazione dell'acquisizione dei 24 cfu per l'insegnamento nella scuola secondaria (D.M. 616/2017)**, *Università degli Studi di Genova, DISFOR*, conseguita il 1/07/2020

- Pedagogia, pedagogia speciale e didattica dell'inclusione (6 cfu di cui M-PED/01 3 cfu, M-PED/03 3 cfu) per Ambito Disciplinare A
- Psicologia (6 cfu di cui M-PSI/06 1 cfu, M-PSI/05 2 cfu, M-PSI/01 1 cfu, M-PSI/04 2 cfu) per Ambito Disciplinare B
- Antropologia (6 cfu di cui M-FIL/03 3 cfu, M-DEA/01 3 cfu) per Ambito Disciplinare C
- Metodi e tecnologie didattiche (6 cfu di cui M-PED/03 1 cfu, M-PED/04 5 cfu) per Ambito Disciplinare D

Experience

1 October 2019 - 31 November 2019 **Intern**, ESAOTE, Genova
Testing denoising algorithms for speckle noise pattern in ultrasound medical images.

Miscellaneous

2016-2018 Homework Tutor, Caritas

Preprints

2023 **Razzetta C., Candiani V., Crocco M. and Benvenuto F.**, *A hybrid time-frequency parametric modelling of medical ultrasound signal transmission*, Under review

<https://arxiv.org/abs/2305.18173>

2022 **Razzetta C., Crocco M. and Benvenuto F.**, *A stochastic approach to delays optimization for narrowband transmit beam pattern in medical ultrasound*, Submitted

<https://arxiv.org/abs/2209.05758>

Research Projects Participation

- 2022 **Metodi numerici per l'imaging: dal 2D al 3D**, *INdAM-GNCS*, Coordinator: Prof. Silvia Tozza
The project aims to develop computational methods for three-dimensional image analysis to solve problems in reconstruction, pattern recognition, segmentation, denoising and image restoration.
- 2020 **MyLab 4.0**, *Esaote S.p.A. - Agenda Digitale FRI*, Coordinator: Pietro Amoretti
The project aims to evolve the current process of managing ultrasound diagnostics from a simple tool for analysis by the physician to an integrated digital service structure for echo-guided diagnostic and interventional radiology available to the entire health care facility, for the benefit of the patient, no matter where the health care service is accessed.
- 2020 **Problemi inversi e applicazioni**, *DIMA - Fondi di Ricerca di Ateneo 2020*, Coordinator: Prof. Federico Benvenuto

Software development

- 2022-2023 **parUST (parallel parametric UltraSound Transmission software)**, *A Python simulator for medical ultrasound linear array probe beam pattern computation. The simulator allows parallelized computations on multiple threads of the impulse response function in order to approximate Beam pattern shapes. After the impulse response computing, the Beam patterns can be computed on CPUs or GPUs cores at the user's discretion.*
<https://github.com/chiararazzetta/parUST>

Talks and Presentations

Lectures at international schools

- 2023 **Winter PhD school on Advanced methods for mathematical image analysis**, *Bologna*, Title: "Ultrasound Biomedical Imaging: improve image quality by automatically optimizing parameters"

Invited Talks

- upcoming **Dolomites Research Week on Approximation and Applications**, *San Vito di Cadore*, September 2023
- upcoming **International Congress of Industrial and Applied Mathematics (ICIAM23)**, *Tokyo*, Title: "A local space-invariant approximation for DAS Point Spread Function calculation". August 2023.
- 2023 **The Artimino conference on Medical Ultrasound Technology**, *Artimino*, Title: "Stochastic approach for automatic optimisation of acquisition parameters for Point Spread Function enhancement"
- 2022 **GIMC-SIMAI YOUNG 2022**, *Pavia*, Title: "Biomedical Ultrasound Beam Patterns Optimization: from a stochastic approach to neural networks"

Contributions in Conferences and Seminars

- 2023 **SIAM Conference on Computational Science and Engineering**, *Amsterdam*, Poster: "A stochastic approach to delays optimization for narrowband transmit beam pattern in medical ultrasound"

2022 **14th IEEE EMBS-SPS International Summer School on Biomedical Imaging, St. Jacut de la Mer, Poster:** "A stochastic approach to transmit delays optimization: enhancing narrowband applications in medical ultrasound"

Teaching and Tutoring Experiences

Teaching

A.A. 2022/23 **Adjunct Professor**, *DIMA-UniGe*, Mini-Course, Ultrasound Biomedical Imaging: model and applications

A.A. 2022/23 **Adjunct Professor**, *DICCA-UniGe*, Course, Elements of Mathematics and Geometry for Technical Occupations

A.A. 2021/22 **Teaching Assistant**, *DIBRIS-UniGe*
Exercise sessions and teaching support for Algebra and Logics for Informatics course

Tutoring

A.A. 2021/22 **Tutor**, *DIMA-UniGe*, Scientific tutor for high school students at the Mathematics stage giving a lesson on mathematics applications.
- A.A.2022/23

A.A. 2022/23 **Tutor**, *DISTAV-UniGe*, Tutor for first year students in Elements of Mathematics Course

A.A. 2021/22 **Tutor**, *DICCA-UniGe*, Tutor for second year students Mathematical Analysis 2 Course

Memberships

2021-now Gruppo Nazionale per il Calcolo Scientifico - Istituto Nazionale di Alta Matematica (INdAM-GNCS)

Computer skills

OS Microsoft Windows, MacOS, Linux

Programming Python, MATLAB, C++, R, SAS, SQL, \LaTeX

Experience Office, PostgreSQL, PyTorch

Languages

Italian Mother tongue

English Professional Level

References

Federico Benvenuto, benvenuto@dim.unige.it

Associate Professor, DIMA - University of Genoa

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I give consent to process my data with the purpose of the recruitment process, in accordance to the Regulation of the European Parliament 679/2016, regarding the protection of natural persons and free movement of such data.