

Andrea Cerri

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Education

2004 – 2006 **Ph.D. Mathematics**, University of Bologna, Italy
XIX cycle, ministerial scholarship granted

Dissertation *Stability and Computation in Multidimensional Size Theory*

Advisor Dr. Patrizio Frosini

1997 – 2003 **M.Sc. Mathematics**, University of Bologna, Italy
mark: 110/110 magna cum laude

Thesis *Proprietà spettrali di dinamiche di spin mediante il formalismo di Diaconis-Stroock*

Advisor Prof. Mirko Degli Esposti

Research Interests

Geometrical/topological methods for data analysis; shape analysis and comparison, and related applications to Pattern Recognition, Computer Vision and Graphics

Experience – Research

2011 – 2012 **Post-doctoral research fellow**, ARCES – University of Bologna
Research project *Persistence-based Data Analysis and Classification*

2010 – 2011 **Project Assistant**, PRIP-Vienna University of Technology
Research project *CHIC – Computing Homology within Image Context*

2008 – 2010 **Post-doctoral research fellow** (renewal), ARCES – University of Bologna
Research project *Shape comparison by means of k -dimensional size functions*

2007 – 2008 **Post-doctoral research fellow**, ARCES – University of Bologna
Research project *Shape comparison by means of k -dimensional size functions*

2007 – 2007 **Professional collaboration contract**, ARCES – University of Bologna
Research Project *Designing algorithms for the computation of multidimensional size functions*

Experience – Teaching

- 2011 – 2012 **Teaching Assistant**, Geometria e Algebra (Geometry and Linear Algebra)
Second Faculty of Engineering (Cesena), University of Bologna
Teaching Assistant, Geometria e Algebra T
Faculty of Engineering, University of Bologna
- 2008 – 2010 **Teaching Assistant**, Matematica generale 2 (Mathematics II)
Faculty of Economics, University of Bologna
Teaching Assistant, Matematica per Economisti (Math Methods for Economics)
Faculty of Economics, University of Bologna
Teaching Assistant, Geometria e Algebra T
Faculty of Engineering, University of Bologna
- April 2008 **Teaching and laboratory activity**, Elementi di Software per la visione
(Softwares for Computer Vision), University of Bologna
Teaching and laboratory activity, Metodi topologici per la visione
(Topological Methods for Computer Vision), University of Bologna
- Research Project *DISTEF – Dispositivi per registrare la Storia Termica del Farmaco*
- 2007 – 2008 **Teaching Assistant**, Matematica per Economisti
Faculty of Economics, University of Bologna
Teaching Assistant, Complementi di Analisi Quantitativa – Matematica
(Quantitative Analysis), Faculty of Economics, University of Bologna
- 2004 – 2007 **Teaching Assistant**, Geometria e Algebra Lineare
Faculty of Engineering, University of Bologna
- 2003 – 2006 **Teaching Assistant**, Complementi di Analisi Quantitativa – Matematica
Faculty of Economics, University of Bologna

Other Experience

Scientific events Organization

- 2012 **CTIC 2012** – 4th International Workshop on Computational Topology in Image
Context, **scientific committee chair**
ACAT 2012 – Applied & Computational Algebraic Topology Advanced School
- 2006 **MEGAI'06** – Metodi Geometrici nelle applicazioni e nell'industria (Geometric
Methods in applications and Industry)

Refereeing

- 2011 **CAIP 2011** – 14th International Conference on Computer Analysis of Images and
Patterns
- 2010 – present **Computer-Aided Design**

Scientific popularization

2008 – present **Collaboration** with *ForMATH Project srl*
mathematics popularization activities

Scientific activity assessment

2010 **Best Poster Award** in collaboration with Dr. Barbara Di Fabio
Conference *Curves and Surfaces 2010*, Avignon (France)

2008 **Guido Paolucci – Giovani Talenti Award**
Company Credito Cooperativo di Gradara Bank (PU)
Motivation to support young researchers distinguished by their scientific activities

Scopus Citation www.scopus.com/home.url
Database Author ID: 8941463000
Citations 39 total citations by 27 documents
h index 3

Further Information

Language skills

Italian Native
English Fluent, both oral and written

Memberships

GNSAGA National Group for Algebraic, Geometric Structures and their Applications
GIRPR Italian Group of Pattern Recognition Researchers
UMI Italian Mathematical Union

References

- **Prof. Massimo Ferri**, Full professor
ARCES and Dipartimento di matematica
University of Bologna
ferri@dm.unibo.it
- **O. Univ. Prof. Dr. Walter G. Kropatsch**, Full professor
Pattern Recognition and Image Processing Group
Vienna University of Technology
krw@prip.tuwien.ac.at

Publications

Preprints

- Cerri, A., and Frosini, P., *Invariance properties of the multidimensional matching distance in Persistent Topology and Homology*, submitted.
- Cerri, A., Di Fabio, B., Ferri, M., Frosini, P., and Landi, C., *Betti numbers in Multidimensional persistent homology are stable functions*, submitted.
- Cerri, A., and Frosini, P., *Necessary conditions for discontinuities of multidimensional size functions*, submitted.

Journals

- Cerri, A., and Di Fabio, B., *On certain optimal homeomorphisms between closed curves*, Forum Mathematicum (accepted for publication).
- Biasotti, S., Cerri, A., Frosini, P., and Giorgi, D., *A new algorithm for computing the 2- dimensional matching distance between size functions*, Pattern Recognition Letters, **32**(14) (2011), 1735 – 1746.
- Cerri, A., and Frosini, P., *Advances in Multidimensional Size Theory*, Image Analysis & Stereology, **29** (2010), 19 – 26.
- Biasotti, S., Cerri, A., Frosini, P., Giorgi, D., and Landi, C., *Multidimensional size functions for shape comparison*, Journal of Mathematical Imaging and Vision, **32**(2) (2008), 161 – 179.
- Cerri, A., Ferri, M., Frosini, P., and Giorgi, D., *Keypics: free-hand drawn iconic keywords*, International Journal of Shape Modeling **13**(2) (2007), 1 – 13.
- Cerri, A., Frosini, P., and Landi, C., *A global reduction method for multidimensional size graphs*, Electronic Notes in Discrete Mathematics, **26** (2006), 1 – 28.
- Cerri, A., Ferri, M., and Giorgi, D., *Retrieval of trademark images by means of size functions*, Graphical Models, **68** (2006), 451 – 471.

Conference proceedings

- Biasotti, S., Bai, X., Bustos, B., Cerri, A., Giorgi, D., Li, L., Mortara, M., Sipiran, I., Zhang, S., and Spagnuolo, M., *SHREC'12 Track: Stability on Abstract Shapes*, In: Proc. Eurographics Workshop on 3D Object Retrieval, Cagliari, Italy, M. Spagnuolo et al. Eds. (2012), 101 – 107.
- Cerri, A., Di Fabio, B., Ferri, M., Frosini, P., and Landi, C., *Preface*, In: Proc. CTIC 2012 – 4th International Workshop on Computational Topology in Image Context, Bertinoro, Italy, LNCS 7309, Massimo Ferri et al Eds. (2012), VI.
- Cerri, A., Di Fabio, B., and Medri, F., *Multi-scale approximation of the matching distance for shape retrieval*, In: Proc. CTIC 2012 – 4th International Workshop on Computational Topology in Image Context, Bertinoro, Italy, LNCS 7309, Massimo Ferri et al Eds. (2012), 128 – 138.

- Biasotti, S., Cerri, A., and Giorgi, D., *Robustness and modularity of 2-dimensional size functions – An experimental study*, In: Proc. CAIP 2011 – 14th International Conference on Computer Analysis of Images and Patterns, Seville, Spain, LNCS 6854, Ainhoa Berciano et al. Eds. (2011), 34–41.
- Cerri, A., Frosini, P., Kropatsch, W. and Landi, C. *A global method for reducing multidimensional size graphs*, In: Proc. GbRPR 2011 – Graph-based Representation in Pattern Recognition, Muenster, Germany, LNCS 6658, X. Jiang, M. Ferrer and A. Torsello Eds. (2011), 1–11.
- Cerri, A., and Frosini, P., *Discontinuities in multidimensional size functions*, Stereology and Image Analysis. Ecs10: Proceeding of the 10th European Conference of ISS., (V.Capasso et al. Ed.), The MIRIAM Project Series, Vol. 4, ESCULAPIO Pub. Co., Bologna, Italy (2009), 327 – 332.
- Biasotti, S., Cerri, A., and Giorgi, D., *k-dimensional Size Functions for Shape Description and Comparison*, In Proc. ICIAP 2007-International Conference on Image Analysis and Processing, Modena (2007), 795 – 800.
- Cerri, A., Giorgi, D., Musè, P., Sur, F., and Tomassini, F., *Shape recognition via an a contrario model for Size Functions*, In: Proc. ICIAR 06, Pòvoa de Varzim, Portugal, LNCS 4142, A. Campilho and M. Kamel Eds. (2006), 410 – 421.
- Cerri, A., Ferri, M., and Giorgi, D., *A new framework for trademark retrieval based on Size Functions*, In: Proc. 2nd Int’l Conf. on Computer Vision, Video and Graphics (VVG’05), Heriot Watt Univ., Edinburgh, E. Trucco, M. Chantler Eds. (2005), 167 – 172.
- Cerri, A., Ferri, M., and Giorgi, D., *A complete keypics experiment with Size Functions*, In: Proc. CIVR 2005, Singapore, Springer LNCS 3568, W.-K. Leow, M.S. Lew, T.-S. Chua, et al. Eds. (2005), 357 – 366.

Conferences, Talks and Posters

- *Multi-scale approximation of the matching distance for shape retrieval*, CTIC 2012 – 4th International Workshop on Computational Topology in Image Context – Bertinoro (Italy), 28 – 30 May 2012, **oral presentation**.
- *Multi-scale approximation of the matching distance for shape retrieval*, Convegno GIRPR 2012 – Certosa di Pontignano (Italy) , 21 – 23 May 2012, **poster presentation**.
- *Approximation Algorithm for the Multidimensional Matching Distance*, Workshop on Computational Topology, The Fields Institute – Toronto (Canada), 7 – 11 November 2011, **invited talk**.
- *Workshop on Sphere Arrangements*, The Fields Institute – Toronto (Canada), 14 – 18 November 2011.
- *Un nuovo algoritmo sul calcolo della distanza di matching 2-dimensionale per il confronto di forme*, “XIX Congresso dell’UMI (Unione Matematica Italiana)”, Bologna (Italy), 12 – 17 September 2011, **oral presentation**.
- *Robustness and modularity of 2-dimensional size functions – An experimental study*, “CAIP 2011 – 14th International Conference on Computer Analysis of Images and Patterns”, Seville (Spain), 29 – 31 August 2011, **oral presentation**.

- *A global method for reducing multidimensional size graphs*, “GbrPR 2011 – Workshop on Graph-based Representations in Pattern Recognition”, Muenster (Germany), 18 – 20 May 2011, **poster presentation**.
- *A global method for reducing multidimensional size graphs*, “CVWW 2011 – Computer Vision Winter Workshop”, Mitterberg, Styria (Austria), 2 – 4 February 2011, **poster presentation**.
- *CTIC – Workshop on Computational Topology in Image Context*, Chipiona (Spain), 10 – 12 November 2010.
- *2-dimensional Matching Distance for Surface Mesh Comparison*, “Curves and Surfaces”, Avignon (France), 24-30 June 2010, **oral presentation**.
- *Optimal homomorphisms between closed curves*, “Curves and Surfaces”, “Curves and Surfaces”, Avignon (France), 24 – 30 June 2010, **poster presentation** with B. Di Fabio.
- *Approximation of the 2-dimensional matching distance in Persistent Topology*, “FG 60 – Computational and Geometric Topology: A conference in honor of Massimo Ferri and Carlo Gagliardi”, Bertinoro, 17 – 19 June 2010, **oral presentation**.
- *The foliation method: Recent results in multidimensional Persistence Topology (and applications to shape comparison)*, “Math-Info 2010: Topological Methods For The Study Of Discrete Structures”, Marseille (France), 1 – 5 March 2010, **oral presentation**.
- *GETCO 2010 – Geometric and Topological Methods in Computer Science*, Aalborg (Denmark), 11 – 15 January 2010.
- *Shape description and comparison via size functions*, “SIMAI – Prospettive di Sviluppo della Matematica Applicata e Industriale in Italia 2009 – In memoria di Angelo Marcello Anile”, Roma, 9th October 2009, **oral presentation**.
- *Advances in Multidimensional Size Theory*, “CGTA 2009 – Conference on Geometry: Theory and Applications”, Plzeň (Czech Republic), 29 June – 2 July 2009, **oral presentation**.
- *Discontinuities in Multidimensional size functions*, “Ecs10 – 10th European Conference of Stereology and Image Analysis”, Milano, 22 – 26 June 2009, **oral presentation**.
- *Comparing Shapes in multidimensional Size Theory*, “Simai 9 – th Congress”, Roma, 15 19 September 2008, **oral presentation**.
- *Comparing Shapes by means of k-dimensional Size Functions*, “5-th European Congress of Mathematics”, Amsterdam (The Netherlands), 14 – 18 July 2008, **poster presentation**.
- *Applications of Size Theory in Shape Comparison*, “Algebraic Topological Methods in Computer Science 2008”, Paris (France), 7 – 11 July 2008, **poster presentation**.
- *XVIII Congresso dell’U.M.I. (Unione Matematica Italiana)*, Bari, 24 – 29 September 2007.
- *k-dimensional Size Functions for Shape Description and Comparison*, “ICIAP 2007 – International Conference on Image Analysis and Processing”, Modena, 10 – 14 September 2007, **poster presentation**.

- *Multidimensional size functions and persistent homology groups for shape comparison*, “SIMAI – Prospettive di Sviluppo della Matematica Applicata in Italia”, Parma, 18 – 19 May 2007, **oral presentation**.
- *ICIAR 06 – International Conference on Image Analysis and Recognition*, Póvoa de Varzim (Portugal), 18 – 20 September 2006.
- *Combinatorial aspects of multidimensional size functions*, “Combinatorics 2006”, Ischia, 25 June – 1 July 2006, **oral presentation**.
- *Retrieval of trademark abstract images by means of size functions*, “Megai 06 – Metodi Geometrici nelle Applicazioni e nell’Industria”, Bologna, 4 March 2006, **oral presentation**.
- *VVG05 – Second International Conference on Vision, Video and Graphics*, Edinburgh (Scotland), 1 – 3 July 2005.
- *Astaa Apprendimento statistico: teoria, algoritmi e applicazioni*, Genova, 9 – 10 June 2005.
- *From Neuroscience to Phenomenology – MATHEMATICAL MODELS OF VISUAL PERCEPTION*, Bologna, 1 – 3 July 2004.

Other Courses

- *ACAT 2012 – Applied & Computational Algebraic Topology Advanced School*, Bologna, 25 – 26 May 2012.
- *International School on Complexity: Course on Statistical Physics of Social Dynamics: Opinions, Semiotic Dynamics, and Language*, Erice, 14 – 19 July 2007.
- *ICVSS 2007 – International Computer Vision Summer School 2007*, Scicli, 9 – 14 July 2007.
- *AIM@SHAPE – International Summer School on Shape Modeling and Reasoning*, Genova, 18 – 22 June, 2007.
- *VISMAC 2004 – La Visione delle macchine*, Trento, 8 – 12 November 2004.