Daniela Giorgi

Daniela Giorgi
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Personal

Place and date of birth: Pescara, Italy, 21st December, 1979. Citizenship: Italian.

Research interests

Computational topology techniques for shape analysis, description, matching and retrieval.

Current position

Since March 2006: Research fellow at IMATI-CNR, Genova. Member of the Shape Modeling Group.

Previous position

January 2003 - December 2005: Ph.D. student at the University of Padua, Italy, and member of the Center of Excellence ARCES (Advanced Research Center for Electronic Systems), University of Bologna, Italy.

Education

March 2006: Ph.D. Computational Mathematics, University of Padua. Dissertation: *Shape analysis and retrieval through size theory.* Advisor: Prof. Massimo Ferri.

October 2002: M.Sc. Mathematics, University of Bologna. Thesis: *Modellazione geometrica con curve circolari a tratti.* Mark: 110/110 cum Laude.

July 1998: Maturità Scientifica, Liceo Statale Leonardo da Vinci, Pescara. Mark: 60/60.

Publications

Refereed journal publications

J1 M. Attene, D. Giorgi, M. Ferri, B. Falcidieno: *On converting sets of tetrahedra to combinatorial and PL manifolds*, Computer Aided Geometric Design 26(8), 850-864, 2009

J2 M. Reuter, S. Biasotti, D. Giorgi, G. Patanè, M. Spagnuolo: *Discrete Laplace-Beltrami operators for shape analysis and segmentation*, Computers & Graphics 33, 381-390, 2009

J3 S. Biasotti, D. Giorgi, M. Spagnuolo, B. Falcidieno: *Reeb graphs for shape analysis and applications*, Theoretical Computer Science 392(1-3), Special Issue on Algebraic and Geometric Computation, 5-22, 2008

J4 S. Biasotti, D. Giorgi, M. Spagnuolo, B. Falcidieno: *Size functions for comparing 3D models*, Pattern Recognition 41, 2855-2873, 2008

J5 S. Biasotti, A. Cerri, P. Frosini, D. Giorgi, C. Landi: *Multidimensional size functions for shape comparison*, Journal of Mathematical Imaging and Vision 32, 161-179, 2008

J6 S. Biasotti, L. De Floriani, B. Falcidieno, P. Frosini, D. Giorgi, C. Landi, L. Papaleo, M. Spagnuolo: *Describing shapes by geometrical-topological properties of real functions*, ACM Computing Surveys 40(4), 12:1-87, 2008

J7 A. Cerri, M. Ferri, P. Frosini, D. Giorgi: *Keypics: free-hand drawn iconic keywords*, International Journal of Shape Modeling 13(2), 125-137, 2007

J8 S. Biasotti, D. Giorgi, G. Patanè: *Differential topology methods for shape description*, PAMM - Proceedings in Applied Mathematics and Mechanics 7(1), 1141901 - 1141902, Wiley Interscience, 2007

J9 A. Cerri, M. Ferri, D. Giorgi: *Retrieval of trademark images by means of size functions*, Graphical Models 68, 451-471, 2006

Refereed book series publications

B1 F. Escolano, D. Giorgi, E. R. Hancock, M. A. Lozano, B. Falcidieno: *Flow Complexity: Fast Polytopal Graph Complexity and 3D Object Clustering.* Springer Lecture Notes in Computer Science, vol. 5534, 253-262, 2009

B2 S. Biasotti, D. Giorgi, S. Marini, M. Spagnuolo, B. Falcidieno: *3D Classification via structural prototypes.* Springer Lecture Notes in Computer Science, vol. 4816, 140-143, 2007

B3 S. Biasotti, D. Giorgi, S. Marini, M. Spagnuolo, B. Falcidieno: *A comparison framework for 3D object classification methods.* Springer Lecture Notes in Computer Science, vol. 4105, 314-321, 2006

B4 A. Cerri, D. Giorgi, P. Muse, F. Sur, F. Tomassini: *Shape recognition via an a contrario model for size functions.* Springer Lecture Notes in Computer Science, vol. 4141, 410-421, 2006

B5 A. Cerri, M. Ferri, D. Giorgi: *A complete keypics experiment with size functions.* Springer Lecture Notes in Computer Science, vol. 3568, 357-366, 2005

Reviewed conference publications

C1 D. Giorgi, M. Attene, G. Patanè, S. Marini, C. Pizzi, S. Biasotti, M. Spagnuolo, B. Falcidieno, M. Corvi, L. Usai, L. Roncarolo, G. Garibotto: *A critical assessment of 2D and 3D face recognition algorithms*, Proceedings AVSS 2009: 6th IEEE International Conference on Advanced Video and Signal Based Surveillance, 79-84, 2009.

C2 D. Giorgi, P. Frosini, M. Spagnuolo, B. Falcidieno: *Multilevel relevance feedback for 3D shape retrieval*, Proceedings 3DOR'09: Eurographics Workshop on 3D Object Retrieval, The Eurographics Association, 45-52, 2009

C3 S. Biasotti, B. Falcidieno, P. Frosini, D. Giorgi, C. Landi, S. Marini, G. Patanè, M. Spagnuolo: *3D shape description and matching based on properties of real functions*, Eurographics 2007 Tutorial Notes, 1025-1074, The Eurographics Association, 2007

C4 M. Spagnuolo, S. Biasotti, D. Giorgi, S. Marini, B. Falcidieno: *3D shape matching and classification via structural prototypes*, Proceedings Israel-Italy Bi-National Conference on Shape Modeling and Reasoning for Industrial and Biomedical Applications, pp. 86-90, 2007 (invited paper)

C5 M. Attene, M. Ferri, D. Giorgi: *Combinatorial manifolds from sets of tetrahedra*, Proceedings NASAGEM: New Advances in Shape Analysis and Geometric Modeling, in CIBERWORLDS 2007, 367-375, IEEE Computer Society, 2007

C6 S. Biasotti, A. Cerri, D. Giorgi: *k-dimensional size functions for shape description and comparison*, Proceedings ICIAP 2007: 14th International Conference on Image Analysis and Processing, 345-352, IEEE Computer Society, 2007

C7 S. Biasotti, D. Giorgi, M. Spagnuolo, B. Falcidieno: *Size functions for 3D shape retrieval*, Proceedings SGP 2006: Eurographics Symposium on Geometry Processing, 239-242, IEEE Computer Society, 2006

C8 A. Cerri, M. Ferri, D. Giorgi: *A new framework for trademark retrieval based on size functions*, Proceedings VVG'05: 2nd International Conference on Vision, Video and Graphics, 152-167, The Eurographics Association, 2005

Other publications

O1 D. Giorgi, S. Marini: *SHape REtrieval Contest 2008: Classification of Watertight Models Track*, Proceedings SMI 2008: International Conference on Shape Modeling and Applications, 219-220, IEEE Computer Society, 2008

O2 D. Giorgi, S. Biasotti, L. Paraboschi: *SHape REtrieval Contest 2007: Watertight Models Track*, in Remco C. Veltkamp Frank B. ter Haar: *SHREC2007 3D Shape Retrieval Contest*, Technical Report UU-CS-2007-015, Utrecht University, 5-10, 2007

O3 D. Giorgi: *Analisi e recupero di forme tramite teoria della taglia*, Bollettino dell'Unione Matematica Italiana Sezione A, Ser. VIII, vol. 10-A, 247-250, 2007

Talks

Computational topology techniques for shape modelling and reasoning, with B. Falcidieno, M. Spagnuolo, S. Biasotti. New trends in Industrial and Applied Mathematics, International Conference in memory of A. M. Anile, Catania, November 2008 (invited)

Comparing shapes in multidimensional size theory, with S. Biasotti, A. Cerri, P. Frosini, C. Landi. IX Congresso SIMAI, Roma, September 2008 (invited)

Computational topology for 3D shape description and matching, with S. Biasotti, G. Patanè, M. Spagnuolo, B. Falcidieno. IX Congresso SIMAI, Roma, September 2008 (invited)

Computation and application issues in multidimensional shape description, with S. Biasotti, A. Cerri, P. Frosini, C. Landi. Algebraic and Topological Methods in Computer Science (ATMCS) III, Paris, July 2008

Reeb graphs for shape analysis and synthesis, with S. Biasotti, M. Spagnuolo, B. Falcidieno. Algebraic and Topological Methods in Computer Science (ATMCS) III, Paris, July 2008

Laplacian eigenfunctions for shape analysis, with S. Biasotti, G. Patanè, M. Spagnuolo. International Conference on Shape Modeling and Applications (SMI), June 2008 (invited)

Modelling, analysis and classification of 3D shapes derived from molecular structures, with M. Mortara, M. Spagnuolo, F. Giannini, M. Attene, S. Biasotti, C. Catalano, G. Patanè, S. Marini, F. Robbiano, R. Albertoni, B. Falcidieno. BioinfoGRID Symposium, Segrate (Milano), December 2007

Confronto di forma mediante funzioni di taglia e gruppi di omologia persistente multidimensionali, with S. Biasotti, F. Cagliari, A. Cerri, B. Di Fabio, M. Ferri, P. Frosini, C. Landi. XVIII Congresso UMI, Bari, September 2007

Differential topology methods for shape description, with S. Biasotti and G. Patané. Minisymposium on Geometric-Topological Methods for 3D Shape Classification and Matching, 6th International Congress on Industrial and Applied Mathematics, Zurich, July 2007 (invited)

Multidimensional size functions and persistence homology groups for shape comparison, with S. Biasotti, F. Cagliari, A. Cerri, B. Di Fabio, M. Ferri, P. Frosini, C. Landi. Convegno SIMAI-INDAM Prospettive di sviluppo della matematica applicata in Italia, Parma, May 2007

Multidimensional Size Theory, with C. Landi, S. Biasotti, A. Cerri, P. Frosini. Computational and Combinatorial Algebraic Topology, Deutsche Mathematiker-Vereinigung and Gesellschaft für Didaktik der Mathematik, Berlin, March 2007 (invited)

Comparing fishes by size functions. VII Congresso SIMAI, Venezia, September 2004 (invited)

Tutorials

Shape matching and retrieval, with S. Biasotti, S. Marini, M. Spagnuolo. International Summer School on Shape Modeling and Reasoning, Genova, June 2007

Retrieval of 3D objects, with S. Biasotti, S. Marini, F. Robbiano, M. Spagnuolo. Utrecht Summer School on Multimedia Retrieval, Utrecht, August 2007

Seminars

Funzioni di taglia per la modellazione di forma, IMATI-CNR, Genova, October 2004 (invited).

Utilizzo delle funzioni di taglia nella descrizione di forme geometriche, IMATI-CNR, Genova, July 2005 (invited).

Retrieval of digital shapes by size functions, DISI, University of Genova, April 2006 (invited).

Participation in research projects

Project *Hybrid metric-topological SLAM integrating computer vision and 3D laser for large environments*, funded by Ministerio de Ciencia y Educación, Spain Government (invited researcher), 2009 -

Italian - Portuguese Bi-national Project *Tecniche avanzate per il recupero di forme tridimensionali (Advanced techniques for 3D shape retrieval)*, 2009 -

European Coordination Action FP7 FOCUS K3D, *FOster the Comprehension, adoption and USe of Knowledge intensive technologies for coding and sharing 3D media content in consolidated and emerging application communities*, 2008 -

Italian - Israeli Bi-national Project SHALOM, *Shape modelling and reasoning: new methods and tools*, 2006 - 2009

European Network of Excellence FP6 AIM@SHAPE, *Advanced and Innovative Models And Tools for the development of Semantic-based systems for Handling, Acquiring and Processing knowledge Embedded in multidimensional digital objects*, 2006 - 2008. I organized the *Watertight Models* and *Classification of Watertight Models* tracks of the SHREC 2007 and SHREC 2008 events

Italian- French Bi-national Project *Galileo*, title *Riconoscimento delle forme: teoria e applicazioni (Ricerca rapida di forme nelle grandi basi di dati)*, 2003 - 2004

Project *MultiTrust*, IMATI-CNR and ELSAG Datamat, 2007 - 2008

CNR Project ICT.P02.008, *Metodi di modellazione e analisi, strumenti di calcolo ad alte prestazioni e grid computing per dati e applicazioni in ambito bioinformatico*, 2007 -

CNR Project ICT.P10.007.002, *Codifica, elaborazione e restituzione della conoscenza legata a media multidimensionali*, 2006 -

CNR Project ICT.P10.009.001, *Tecniche avanzate per l'analisi e la sintesi di forme digitali 3D*, 2005 -

CNR Project ICT.P03.009, titolo *Media-Net: Rete di eccellenza CNR e laboratorio virtuale per l'analisi e la sintesi di media multidimensionali*, 2005 -

CNR Project DG.RSTL.050.008, titolo *Topologia e omologia per la rappresentazione iconica di forme geometriche 3D*, 2005 -

Project RP2 *Computer Vision and Image Processing Systems*, Centre of Excellence E. De Castro: Advanced Research Center for Electronic Systems (ARCES), Bologna University, 2003 -

FIRB-MIUR Project ASTAA, *Apprendimento Statistico: Teoria, Algoritmi, Applicazioni*, 2003 - 2005

FIRB-MIUR Project MacroGEO, *Metodi Algoritmici e Computazionali per la Rappresentazione di Oggetti Geometrici*, 2003 - 2005

Teaching

Geometria e Algebra L-A, Ingegneria Elettronica, University of Bologna, winter 2004 and winter 2005 (assistant teacher, one semester, 2 hours per week)

Geometria e Algebra L, Ingegneria Civile, University of Bologna, winter 2005 (assistant teacher, one semester, 2 hours per week)

Matematica della Visione, Master in Matematica per le Applicazioni, University of Bologna, summer 2004 and summer 2005 (assistant teacher, 10 hours)

Master students advised

Alessandro Morelli, *Implementazione della turning function per il recupero di immagini basato sul contenuto*, Master thesis, Electronic Engineering, University of Bologna, 2003

Alessandro Rossi, *Implementazione della signature function per il recupero di immagini basato sul contenuto*, Master thesis, Electronic Engineering, University of Bologna, 2004

Flavio Neri, *Recupero di marchi di fabbrica mediante operazioni morfologiche e funzioni di taglia ridotte*, Master thesis, and *Preelaborazione di immagini di marchi di fabbrica*, Tirocinium, Mathematics, University of Bologna, 2005

Niccolò Cavazza, *Preelaborazione di immagini di targhe automobilistiche arabe*, Tirocinium, Mathematics, University of Bologna, 2005

Francesca Marini, *Sviluppo di un programma in C++ per effettuare operazioni morfologiche su immagini*, Tirocinium, Mathematics for Applications, University of Bologna, 2005

Valerio Venturi, *Implementazioni di invariant signatures e test su un database di immagini*, Tirocinium, Mathematics for Applications, University of Bologna, 2005

Genova, 25th September 2009

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