João Antonio Paixão

CONTACT INFORMATION

Ph.D. student
Department of Mathematics
Pontifícia Universidade Católica do Rio de Janeiro
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RESEARCH INTERESTS

Computational Topology & Geometry, Complexity Analysis, Combinatorial Optimization

EDUCATION

Pontifícia Universidade Católica, Rio de Janeiro, Brazil

Ph.D., Mathematics, August 2010 to present

- Thesis Topic: *Algorithmic Analysis of Discrete Morse Theory*
- Advisor: Professor Thomas Lewiner
- Area of Study: Computational Geometry & Topology

M.S., Mathematics, August 2008 to August 2010

- Thesis Topic: *Vector Field Denoising*
- Advisor: Professor Hélio Lopes
- Co-advisor: Professor Thomas Lewiner
- Area of Study: Computational Geometry & Topology, Signal Processing

Virginia Tech, Virginia, United States

B.S., Mathematics, August 2003 to May 2007

- *Cum Laude* in Mathematics
- Specialization in combinatorics and graph theory

ADDITIONAL ACADEMIC EXPERIENCES

Doctoral Internship August to December 2012
School of Mathematics and Physics, The University of Queensland
- Supervisor: Professor Benjamin B. Burton
- Focus: Computational topology, normal surface theory, and discrete Morse theory
- Scholarship awarded by FAPERJ

Undergraduate Research Experience June to July 2006
Department of Mathematics, Trinity University
- Supervisor: Professor Scott Chapman
- Focus: Group theory and factorization properties of numerical monoids
- Scholarship awarded by National Science Foundation

REFEREED JOURNAL PUBLICATIONS

[1] Lewiner, Thomas ; Marques, Clarissa ; Paixão, João; Botton, Scarlett ; Cabral, Allyson ; Nascimento, Renata ; Mello, Vinicius ; Peixoto, Adelailson ; Martinez, Dimas ; Vieira, Thales ; Lage, Marcos . Stereo music visualization through manifold harmonics. *The Visual Computer*, v. 27, p. 905-916, 2011.

[2] Baginski, Paul; Chapman, Scott; Hine, Natalie; Paixão, João. On the asymptotic behavior of unions of sets of lengths in atomic monoids. *Involve*, a Journal of Mathematics, v. 1, p. 101-110, 2008.

[3] Amos, Jeff ; Chapman, Scott ; Hine Natalie ; Paixão, João. Sets of lengths and unions of sets of lengths do not characterize numerical monoids. *Integers*, v. 7, p. A50, 2007.

Conference Publications

[4] Burton, Benjamin B. ; Lewiner, Thomas ; Paixão, João ; Spreer, Jonathan. Parameterized Complexity of Discrete Morse Theory. In: Symposium on Computational Geometry, 2013, Rio de Janeiro. ACM Symposium on Computational Geometry, 2013 *(to appear)*.

[5] Burton, Benjamin; Paixão, João ; Spreer, Jonathan. Computational topology and normal surfaces: Theoretical and experimental complexity bounds. In: ALENEX 2013: Meeting on Algorithm Engineering and Experiments, New Orleans, 2013. p. 78-87.

[6] Paixão, João ; Lopes, Hélio ; Lewiner, Thomas. Feature-Preserving Vector Field Denoising. In: Sibgrapi 2011 - Workshop of Theses and Dissertations, Maceió. SBC, 2011. v. 3. p. 115-120.

[7] Nascimento, Renata; Paixão, João ; Lopes, Helio ; Lewiner, Thomas. Topology Aware Vector Field Denoising. In: Sibgrapi 2010: XXIII Conference on Graphics, Patterns and Images, Gramado. IEEE, 2010. p. 103-109.

[8] Lewiner, Thomas ; Vieira, Thales ; Bordignon, Alex ; Cabral, Allyson ; Marques, Clarissa ; Paixão, João ; Custodio, Lis ; Lage, Marcos ; Andrade, Maria ; Nascimento, Renata ; Botton, Scarlett ; Pesco, Sinésio ; Lopes, Helio ; Mello, Vinícius ; Peixoto, Adelailson ; Martinez, Dimas . Tuning Manifold Harmonics Filters. In: Sibgrapi 2010: XXIII Conference on Graphics, Patterns and Images, Gramado. IEEE, 2010. p. 110-117.

[9] Paixão, João ; Lage, Marcos ; Petronetto, Fabiano ; Bordignon, Alex ; Pesco, Sinésio ; Tavares, Geovan ; Lopes, Helio. ; Lewiner, Thomas . Random Walks for Vector Field Denoising. In: Sibgrapi 2009: XXII Brazilian Symposium on Computer Graphics and Image Processing, Rio de Janeiro. IEEE, 2009. p. 112-119.

Conference Talks

[10] 29th Annual ACM Symposium on Computational Geometry. Universidade Federal do Estado do Rio de Janeiro - UNIRIO. Parameterized Complexity of Discrete Morse Theory. (June 2013)

[11] Sibgrapi 2009: XXII Brazilian Symposium on Computer Graphics and Image Processing. Apresentação do trabalho: Random Walk for Vector Field Denoising (October 2009).

[12] Shenandoah Undergraduate Mathematics and Statistics Conference. James Madison University, Virginia, EUA (October 2006).

Conference Posters

[13] Paixão, João ; Lopes, Hélio ; Lewiner, Thomas. Feature-Preserving Vector Field Denoising. In: Sibgrapi, 2011, Maceió. XXIII Conference on Graphics, Patterns and Images. August 28-31, 2011.

Invited Talks

[14] Computer Graphics Seminar at IMPA. Topology Aware Vector Field Denoising. October 1, 2010.

Other Publications

[15] Paixão, João. Feature-preserving vector field denoising. Master's thesis. Pontifícia Universidade Católica, Rio de Janeiro, Brazil, 2010.

[16] Paixão, João ; Hine, Natalie. Length Sets and V-Sets of Numerical Monoids. Final report for undergraduate research experience. Trinity Research Experience for Undergraduates. Trinity University, Texas, USA, 2006, http://ramanujan.math.trinity.edu/tumath/research/studpapers/s52.pdf

Papers in Preparation

[17] Paixão, João ; Lewiner, Thomas. Stable matching and discrete gradient fields.

[18] Paixão, João ; Lewiner, Thomas. Combinatorial tensor fields.

Teaching Experience

The University of Queensland, Brisbane, Australia **August to November 2012**

Tutor for Queensland Informatics and Programming Club
Introduction to programming and algorithms to high school students

Pontifícia Universidade Católica, Rio de Janeiro, Brazil **August 2010 to September 2011**

Teacher for MAT1163: Multivariable calculus
Multivariable calculus for engineering undergraduate students

Escola de Cinema Cinco Visões, Rio de Janeiro, Brazil **September 2010 to May 2011**

Teacher for general mathematics and physics
High-school mathematics and physics for electricians and audio-visual technicians

C2 Education, New York, United States **August 2007 to April 2008**

Teacher for advanced placement calculus and physics
High-school students preparing for college

Virginia Tech, Virginia, United States **August 2005 to December 2006**

Tutor at the Math Emporium
Courses of linear algebra, introduction to calculus, and vector calculus

Academic Service

Referee Service

- The Visual Computer
- Sibgrapi 2012 - Workshop of Theses and Dissertations: XXV Conference on Graphics, Patterns and Images.
- Sibgrapi 2011: XXIV Conference on Graphics, Patterns and Images
- Sibgrapi 2010: XXIII Conference on Graphics, Patterns and Images

Conference Service

- Member of the local organizing committee: 29th Annual ACM Symposium on Computational Geometry. Universidade Federal do Estado do Rio de Janeiro. Rio de Janeiro, Brazil (June 2013).
- Member of the local organizing committee: Sibgrapi 2009. XXII Brazilian Symposium on Computer Graphics and Image Processing. Rio de Janeiro, Brazil (October 2009).