Carlos **Ronchi**

Mathematician

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Education

USP (University of São Paulo) — *São Carlos, SP, Brazil*

M.Sc. in Mathematics — *Aug. 2017 - Nov. 2019*

- Supervisor: Marcio Gameiro
- GPA: 3.83/4.00

Rutgers University — *Piscataway, New Jersey, USA*

Visiting Research Student — *Jan. 2019 - Jun. 2019*

- FAPESP Scholarship.
- Supervisor: Konstantin Mischaikow.

UFPR (Federal University of Paraná) — *Curitiba, Brazil*

B.S. in Mathematics — *Apr. 2013 - Jul. 2017*

- Got a scholarship to spend one and a half year in Germany. First six months spent in a german language course. The other one year was spent at RFW-Universität Bonn, Bonn, Germany (Apr. 2015 - Feb. 2016) taking classes.
- GPA: 93.93/100.00

Research Experience

Intern at Cathrin's lab at School of Life Sciences - EPFL — *Lausanne, Switzerland*

funded by École polytechnique fédérale de Lausanne (EPFL) — *Jan. 2020 - May 2020*

- Studying RNA-seq methods and how they are used in breast cancer analysis.

Master's student — *São Carlos, Brazil*

funded by Fundação de Amparo à Pesquisa do Estado de São Paulo — *Aug. 2017 - Nov. 2020*

- Applied persistent homology to understand the protein structure and predict its stability;
- Combined machine learning and persistent homology to improve the accuracy in image classification problems.

Undergradute researcher — *Curitiba, Brazil*

funded by Programa de Atração de Jovens Talentos (CSF-PAJT) — *Jul. 2016 - Jul. 2017*

- Studied foundations of analysis and multilinear algebra;
- Studied numerical analysis methods for matrix decomposition;
- Studied and implemented both stochastic and conjugate gradient method, SVM, neural networks and logistic regression;
- Applied Convolutional Neural Networks to predict LaTeX characters.

Teaching and Outreach

PET - Educational Project — *Curitiba, Brazil*

Core Member, funded by national government — *Aug. 2013 - Jul. 2014, Mar. - Jun. 2016*

- Developed teaching resources to teach high leve mathematics to 100 high school students during one week. The topics were:
  - Number Theory and Criptograhy;
  - Euclidean and Non-Euclidean geometries.
- Organized an one week long academic session for math students, with courses and invited lectures.

Teaching Assistant - Analytic Geometry — *Curitiba, Brazil*

Federal University of Paraná — *Mar. 2016 - Jun. 2016*

- Organized weekly meetings with students to help them and solve problems in Analytic Geometry.

Skills

Programming Languages Julia, Python, LaTeX, MATLAB

Languages Portuguese (Native), English (108 TOEFL), German (very good command)

Projects

ProteinPersistent.jl

https://github.com/chronchi/ProteinPersistent.jl

- Package that provides an interface for some functions of BioPython. It also calculates the persistent homology of a protein using the python package ripser.

HSP.jl

https://github.com/chronchi/HSP.jl

- Julia implementation of a package to calculate the optimal Hansen Solubility Parameters.

MapperMDS.jl

https://github.com/chronchi/MapperMDS.jl

- Mapper is an algorithm from topological data analysis that helps visualize high dimensional data. This is an implementation in Julia that particularly accepts a distance matrix as input.

PersistenceImage.jl

https://github.com/chronchi/PersistenceImage.jl

- Persistence image is a vectorization method for persistence diagrams. This is an implementation of the algorithm in Julia.

Honors & Awards

2010	**Bronze medal**, National Astronomy Olympiad	*Curitiba, Brazil*
2011	**Bronze medal**, National Astronomy Olympiad	*Curitiba, Brazil*
2018	**Best Poster Presentation**, 8th Workshop of Thesis and Dissertations at ICMC - USP	*São Carlos, Brazil*

Events

May. 2019	**Geometric Data Analysis**, Persistent homology and the protein folding problem	*Chicago, USA*
Apr. 2019	**Data Driven Dynamics: Algebraic Topology, Combinatorics and Analysis**, Persistent homology and the protein folding problem	*Montreal, Canada*
Aug. 2018	**8th Workshop of Thesis and Dissertations of ICMC**, Optimal cycles and applications in machine learning	*São Carlos, Brazil*
Aug. 2018	**XXI Brazilian Topology Meeting**, Optimal cycles and applications in machine learning	*Niteroi, Brazil*
Aug. 2018	**TRIPODS Summer Bootcamp: Topology and machine learning**, Optimal cycles and applications in machine learning	*Providence, USA*
Nov. 2016	**Jornada de Matemática, Matemática Aplicada e Educação Matemática**	*Curitiba, Brazil*
Oct. 2015	**Automatic sequences, Number Theory, Aperiodic Order**	*Delft, The Netherlands*
Oct. 2015	**Panorama of Mathematics**	*Bonn, Germany*