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Alister Machado dos Reis

PhD Candidate

Education

2021– **PhD Candidate**, *Utrecht University, Visualization and Graphics Group*, Utrecht, NL
PhD in Data Visualization, researching the interplay of Machine Learning and Dimensionality Reduction.
Expected Graduation: September 2026.

2015–2018 **M.Sc. in Data Science**, *INP Grenoble*, Grenoble, France, *magna cum laude*
Thesis: Incremental Learning Applied to Streaming Environments.

2015–2018 **Information Systems Engineering**, *INP Grenoble*, Grenoble, France
Thesis: Advanced Indexes for In-Memory Query Processing.

2012–2018 **B.S. in Computer Science**, *Federal University of Rio Grande do Sul*, Porto Alegre, Brazil
This degree was obtained concurrently with the M.Sc. degree above as part of the highly competitive double degree program BRAFITEC in partnership with the Institut National Polytechnique Grenoble.

Master thesis

title *Incremental Learning Applied to Streaming Environments* (available here)

supervisors Dr. Norman May, Dr. Jérôme Malick, and Dr. Bruno Castro da Silva

description Thesis conducted at SAP Labs LLC in San Ramon, CA, USA. Researched, analyzed, and created new metrics for the evaluation of various Incremental Learning techniques for streaming data, comparing SAP's existing approach with alternatives sourced from literature review. Used `Python` for coding and `R/Python` for data analysis.

Experience

2021– **PhD Candidate**, *Utrecht University*, Utrecht, The Netherlands
Research conducted in the Visualization and Graphics Group (VIG) led by prof. Dr. Alexandru Telea. Advisor: Dr. Michael Behrisch.
Research focus: Synergies between Machine Learning (ML) and Dimensionality Reduction (DR).
Research vision: Developing strategies and algorithms for representing interesting aspects of the data space/distribution in a lower-dimensional space (2D or 3D), allowing users to "see" into their data. Since this must involve some sort of dimensionality reduction, I also research reliable ways to assess the quality of DR methods.
Achievements:
- developed a new DR technique (ShaRP [3]) using a modified Variational Auto-Encoder to allow cluster shape control. This work won the *best paper award* and led to an invitation for an extended version published in the *Computers & Graphics* journal [2];
- expanded the xAI technique of Decision Boundary Maps using gradient-based views called Differentiable Decision Boundary Maps (∂DBMs [1]) leading to an *honorable mention award*.

2018–2021 **Software Engineer**, *Google*, Belo Horizonte, Brazil
Data analysis and architecture design, extensively using `C++`, `Java`, `Python`, and `Go`.
Achievements:
- Search Awareness Team
  - Developing monitoring infrastructure – `C++`, `Go`
  - Large-scale data analysis and designing internal taxonomies for standardized data collection, involving work across the Search pipeline (from the frontend to the backend of the Search web server, as well as in logs processing) – `Python`, `Java`
- Bias in Search Team
  - Bias detection in Ranking components – `C++`
  - Large scaled data analysis to support the design of fixes to bias issues in Ranking
  - Proposal of front-end and data changes for a specific feature that had multiple occurrences of biased language.

Feb–Aug 2017 **Data Science Intern**, *SAP Labs LLC*, San Ramon, CA, USA
Researched, analyzed, and created new metrics for the evaluation of various Incremental Learning techniques for streaming data, using `Python` and `R`.

Mar–Jul 2016 **Development Intern**, *SAP SE*, Walldorf, Germany
Designed, implemented, and tested a new type of index structure for the SAP HANA Database. Coding in `C++` and using `Python` and `R` for data analysis.

Teaching

2024– **Thesis co-supervisor**, *Utrecht University*, Utrecht, The Netherlands
Supervising B.Sc. and M.Sc. students in their theses.
- Tomás Carrilho (M.Sc. thesis, in progress): dimensionality reduction for area-accurate cartogram drawing, co-supervised with Dr. Tamara Mchedlidze.

2021– **Substitute lecturer**, *Utrecht University*, Utrecht, The Netherlands
Taught 12 course-hours in the Data Analytics course, covering Classification basics (Decision Trees, SVMs, Naive Bayes, Neural Networks) and advanced techniques (Deep NNs, Convolutional NNs, Auto-Encoders).

2021– **Head Teaching Fellow**, *Utrecht University*, Utrecht, The Netherlands
Head TF in the Data Analytics course.
Main responsibilities include managing Teaching Assistants, standardizing rubrics for student evaluation, sourcing new datasets for assignments.

Aug–Dec 2014 **Teaching Assistant**, *UFRGS*, Porto Alegre, Brazil, *(paid position)*
Taught and evaluated freshman students in the practical sessions of the Algorithms and Programming course (taught in `C`), amounting to 60 hours of classes.

Languages

Portuguese	Native	French	Bilingual
English	Bilingual	Dutch	Limited working proficiency

Skills

- **Programming:** Proficient in the use of `Python` and `C++`. Familiar with `Rust`, `Go`, `C`, `Java`, and `Haskell`.
- **Research:** Excellent initiative, planning, and execution of independent research, paired with great presentation skills.
- **Open Source:** Artifacts for my publications are openly available on my Github. Published a Python library for DR Quality Metrics using `TensorFlow` as the backend (PyPI, Github).
- **Mentoring:** Student mentoring (thesis supervision). Peer mentoring experience in Maths (Calculus, Linear Algebra, ...), Theoretical Computer Science (Formal Semantics, Automata Theory), Applied Computer Science (Programming).
- **Background:** Strong background in Algorithms, Complexity, Data Structures, Compilers, Operating Systems, Operational Research, and Computing Theory. Strong graduate-level background in Probabilistic Graphical Models, Machine Learning, and Convex Optimization.

Publications

[1] **Alister Machado**, Michael Behrisch, and Alexandru Telea. "Exploring Classifiers with Differentiable Decision Boundary Maps". In: *Computer Graphics Forum* (2024). **Honorable Mention Award**. ISSN: 1467-8659. DOI: `10.1111/cgf.15109`.

[2] **Alister Machado**, Alexandru Telea, and Michael Behrisch. "Controlling the scatterplot shapes of 2D and 3D multidimensional projections". In: *Computers & Graphics* (2024), p. 104093. DOI: `10.1016/j.cag.2024.104093`.

[3] **Alister Machado**, Alexandru Telea, and Michael Behrisch. "ShaRP: Shape-Regularized Multidimensional Projections". In: *EuroVis Workshop on Visual Analytics (EuroVA)*. **Best Paper Award**. The Eurographics Association, 2023. ISBN: 978-3-03868-222-6. DOI: `10.2312/eurova.20231088`.

[4] Yu Wang, **Alister Machado**, and Alexandru Telea. "Quantitative and Qualitative Comparison of Decision-Map Techniques for Explaining Classification Models". In: *Algorithms* 16.9 (2023), p. 438. DOI: `10.3390/a16090438`.

[5] Alexandru Telea, **Alister Machado**, and Yu Wang. "Seeing is Learning in High Dimensions: The Synergy Between Dimensionality Reduction and Machine Learning". In: *SN Computer Science* 5.3 (2024), p. 279. DOI: 10.1007/s42979-024-02604-y.

Other Awards and Distinctions

2016 Best Master's Student Poster Award, SAP HANA Open House 2016 – Walldorf, Germany

2015 Science Without Borders Student Exchange Award (*Ciência Sem Fronteiras Scholarship*) – BRAFITEC, 2 years long Double Degree program funded by the Brazilian Ministry of Education

2006–2008 One Bronze Medal and two Honorable Mentions in the Brazilian Public Schools Math Olympics, National level competition.

References

Academic

- Dr. Alexandru Telea – a.telea@uu.nl
- Dr. Michael Behrisch – m.behrisch@uu.nl
- Dr. Tamara Mchedlidze – t.mtsentlintze@uu.nl
- Dr. Bruno da Silva – bsilva@cs.umass.edu

Industry

- Bruno Possas – bavep@google.com
- Daniel Faria – dbfaria@google.com

(more upon request)

Interests

Pedagogy I dedicate a significant part of my free time to reading books on pedagogy and teaching. My go-to authors are bell hooks and Paulo Freire.

Bouldering I have been practicing bouldering for almost two years now.

Programming I aim to learn and practice new concepts and programming languages as a continuous hobby.