Adrián Arnaiz Rodríguez

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Alicante, Spain
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ELLIS PhD Student in ML

GitHub: AdrianArnaiz
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Personal WWW & Google Scholar

Research Topic I'm a '97 Spanish ELLIS PhD Student focused on my 1st year PhD with a strong interest in Algorithmic Fairness using Causality and Graph theory. **ELLIS** is an AI research network focused on excellence, with 35 units in 15 countries of Europe (Oxford, Cambridge, EPFL, ETH, Max plank, Alicante...). ELLIS has 199 PhD students around Europe with an acceptance rate of <5%, and all of them have joint supervision from 2 different countries.

My current thesis addresses the ethical implications of ML decisions, including concepts such as privacy, transparency, accountability, reliability, autonomy, and fairness, which urgently need to be taken into account in critical decision-making scenarios. In this thesis, (1) we study what data might be the cause of unfairness or what data should look like in a "fair" world (2) fairness in graph data to capture complex data relationships and human-generated data, and (3) go beyond observational data and study the long term effects and feedback loops of these proposed algorithms using causality. Specifically, we first study the influence of each data point in a fairness metric for reducing the bias in ML models using *Data Valuation*. Second, we study *Graph Rewiring* methods that ensure fair graph data, and finally, we use *Causality* to improve these methods going beyond observational data for developing fair robust models. Everything with the main focus on explaining **what data causes unfairness or asking the algorithm what data should look in a fair world**.

EDUCATION

PhD Student / Fairness in ML   *Dec 2021 — Present*
ELLIS Alicante – Institute of Humanity-centric AI (European Laboratory for Learning and Intelligent Systems)
- Researching on Fairness in ML decision making leveraging graph theory, game theory and causality.
- Supervised by **Dr. Nuria Oliver** (ELLIS), **Dr. Manuel Gómez Rodríguez** (MPI-SWS) and **Dr. Francisco Escolano** (UA)
- 6-months exchange at Max Plank Institute for Software Systems (MPI-SWS), Kaiserslautern, 2023
- More info: [European Lab. for Learning and Intelligent Systems - ELLIS] [Research Topic]

MSc in AI & Data Science   *Jan 2020 — Jan 2021*
Universitat Oberta de Catalunya   *GPA:9.7/10*
- Evaluated both Masters and Thesis with Honors
- **Thesis** supervised by Dr. Baris Kanber from University Collegue of London: *Deep Convolutional Autoencoder for denoise T1 brain MRI*

BSc in Computer Engeneering   *Sep 2015 — Jun 2019*
University of Burgos   *GPA:8.9/10*
- Evaluated both Bachelors and Thesis with Honors
- Extraordinary award: best student in the promotion.
- **Thesis** carried out in ADMIRABLE research lab: *Use of biomarkers extracted from the voice for the detection of Parkinson*

PROFESSIONAL EXPERIENCE

Research Staff   *Jan 2020 — Aug 2021*
ADMIRABLE and DATAHES research labs   *University of Burgos, Spain*
- European project [2019-1-ES01-KA204-065615] Self-Regulated Learning: SmartArt.
- Behavioural VR data analysis and Platform *UBUMLaas*
- Academic production shown in *Publications* section (Topic: Network Science and Web mining)

AI Consultant   *Aug 2019 — Jan 2020*
Ernst & Young   *Madrid, Spain*
- Building ML models for RPA integration: Intelligent Automation

Research intern   *Dec 2018 — Jun 2019*
ADMIRABLE research lab   *University of Burgos, Spain*
- Research intern with collaboration scholarship. Research in the project *Use of biomarkers extracted from the voice for the detection of Parkinson* (BSc Thesis).

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Pre Prints

[1] Adrián Arnaiz-Rodríguez, Ahmed Begga, Francisco Escolano, and Nuria Oliver. "DiffWire: Inductive Graph Rewiring via the Lovász Bound". arXiv preprint arXiv:2206.07369. 2022. URL: https://arxiv.org/abs/2206.07369.

Conference Publications

[1] Adrián Arnaiz-Rodríguez, José Miguel Ramírez-Sanz, José Luis Garrido-Labrador, and Alicia Olivares-Gil. "Computer Science doctoral research in Spain. A relational perspective". In: *Actas de la XIX Conferencia de la Asociación Española para la Inteligencia Artificial*. Universidad de Málaga. Málaga, 2021, pp. 667–672. ISBN: 978-84-09-30514-8. URL: https://caepia20-21.uma.es/inicio_files/caepia20-21-actas.pdf#page702.

[2] José Luis Garrido-Labrador, José Miguel Ramírez-Sanz, Virginia Ahedo, César Arnaiz-Rodríguez Adrián García-Osorio, José Ignacio Santos, and José Manuel Galán. "Network analysis of co-participation in thesis examination committees in an academic field in Spain". In: *Abstract book of the 14th International Conference on Industrial Engineering and Industrial Management and XXIV Congreso de Ingeniería de Organización*. Universidad Carlos III de Madrid. Burgos, 2020. URL: https://eventos.uc3m.es/_files/_event/_43190/_editorFiles/file/BookOfAbstracts10.pdf.

Journal Publications

[1] Alicia Olivares Gil, Adrián Arnaiz Rodríguez, José Miguel Ramírez Sanz, José Luis Garrido Labrador, Virginia Ahedo García, César García Osorio, José Ignacio Santos Martín, José Manuel Galán Ordax, et al. "Mapping the scientific structure of organization and management of enterprises using complex networks". In: *International Journal of Production Management and Engineering* 10.1 (2022), pp. 65–76. URL: https://polipapers.upv.es/index.php/IJPME/article/view/16666.

[2] Esther Cubo, Adrian Arnaiz-Rodriguez, Álvar Arnaiz-González, José Francisco Díez-Pastor, Meredith Spindler, Adriana Cardozo, Alvaro Garcia-Bustillo, Zoltan Mari, and Bastiaan R Bloem. "Videoconferencing Software Options for Telemedicine: A Review for Movement Disorder Neurologists". In: *Frontiers in neurology* (2021), p. 1812. URL: https://www.frontiersin.org/articles/10.3389/fneur.2021.745917/full.

[3] María Consuelo Sáiz-Manzanares, Ismael Ramos Pérez, Adrián Arnaiz Rodríguez, Sandra Rodríguez Arribas, Leandro Almeida, and Caroline Françoise Martin. "Analysis of the learning process through eye tracking technology and feature selection techniques". In: *Applied Sciences* 11.13 (2021), p. 6157. URL: https://www.mdpi.com/2076-3417/11/13/6157/htm.

Honors & Awards

Top 10% Reviewer ICML 2022 [Link]   *International Conference on Machine Learning, July 2022*
Selected in the top 10% best reviewers in ICML 2022 Conference.
FPU PhD Fellowship (Declined) - FPU20/03687   *Spanish Government - Ministry of Universities, Sep 2021*
Grants for pre-doctoral contracts in Spanish Universities.
Extraordinary Award of Bachelors in Computer Engineering   *Council of the University of Burgos, Dec 2019*
Best student's record of the Degree in Computer Engineering of the University of Burgos, among all the students graduated in 18/19.
Prototype Award   *OTRI (Information Transfer Office of Burgos University), Feb 2019*
Project awarded: Use of bio-markers extracted from the voice for the detection of Parkinson.
Undergraduated Research Fellowship   *University of Burgos, Dec 2018*
Assistant research Fellowship in the Civil Engineering department of the University of Burgos, research group ADMIRABLE
Courses with honors   *Bachelor's and Master's*
8 out of 10 MSc courses evaluated with honours, included Thesis. 10 BSc courses evaluated with honours, included Thesis.

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Talks

A Fairness perspective in algorithmic decision-making [Link]   *University of Burgos (online), Mar 2022*
[ELLIS Talks] Fairness in Machine Learning: From introduction to current approaches [Link] *University of Alicante, Jan 2022*
Data processing in Advance Learning Technology [Link]   *Self-Regulated Learning in SmartArt Learning conference, Jul 2021*

Scientific Community Services

Reviewer
[External reviewer] Journal of Complexity 2022.
[External reviewer] ICML 2022 - International Conference on Machine Learning - **Top 10% Outstanding Reviewer**
[PC member] ECML-PKDD 2022 - European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (x4 papers)
[External reviewer] The Web Conference 2022 (WWW'22), ACM, New York.
[PC member] IEEE Transactions on Computational Social Systems 2022.

Scientific organization
Head of organization of ELLIS Doctoral Symposium 2022   *Alicante, Sep 2022*
Head of organization of ELLIS HCML Reading Group: guest sessions and round tables   *bi-weekly sessions*
Moderator of Qualcomm+ELLIS Reading Group Session about GNN+HCML   *Online, Feb 2022*
    Round table: Pim de Haan, Carlos Castillo, Efstatios Gavves and Manuel Gómez Rodríguez
Volunteer at NeurIPS Workshop "Human-Centered AI"   *Virtual, Dec 2021*

Open Source software
Open source code from both BSc and MSc final projects
Occasional collaborator in Lightly AI PyTorch-based library for Self-Supervised Learing. Main contributor of *Lightly version 1.1.2* More open source codes in GitHub: applications, experiments and data analysis

Activities

Final stage II Premios Semilla Empresarial (Business Seed Awards)[Project]   *Mar 2017*
3rd place in Innovation Contest Spin Up CyL by Junior Achievement Foundation Spain [Project]   *Jan 2017*

Skills

Languages and libs	Python, R, Tensorflow, PyTorch, PyGeometric
More interests	Mathematical optimization, Mathematical Modeling, GNN, Reinforcement Learning
Communication	Spanish (native), English (Fluent), German (A1)

Updated: 25th August 2022