Alejandro Almodóvar

PhD student in Causal Deep Learning for Health

aalmodovares aalmodovares.github.io alejandro-almodovar alejandro.almodovar@upm.es

Education

Universidad Politécnica de Madrid — Madrid, Spain
PhD. Communication Systems and Technologies — Currently

Thesis keywords: Causal inference, Federated learning, Longitudinal data, Treatment effects, Hidden confounding, Structural causal models, AI for health

Saarland University — Saarbrücken, Germany
Visiting Researcher in Probabilistic Machine Learning Lab — May - September 2024

Universidad Politécnica de Madrid — Madrid, Spain
M.S. Telecommunication Engineering — June 2022

Universidad Politécnica de Madrid — Madrid, Spain
B.S. Telecommunication Engineering — June 2020

Skills

Programming languages: Python (primary), Java, JavaScript/TypeScript, HTML/CSS, R, LaTeX, MATLAB

Tools: Git/GitHub, PyCharm, RStudio, Torch

Specialized knowledge: Machine learning, Bayesian inference, Probabilistic methods, Causal learning, Statistics.

Languages: Spanish (native), English (fluent)

Publications

- **Inverse Reinforcement Learning: a New Framework to Mitigate an Intelligent Backoff Attack.**
  Parras, J., **Almodóvar, A.**, Apellániz, P.A., Zazo, S. (**2022**)
  IEEE Internet of Things Journal, vol 9, no. 24, pp.24790-24799.
  - Journal metrics (2021): IF: 10.238, Rank Q1 (94.15 in Telecommunications, 94.82 in Computer Science: Information Systems, 93.66 in Engineering: Electrical and Electronic)
- **Federated learning for causal inference using deep generative disentangled models.**
  Almodóvar, A., Parras, J., Zazo, S. (**2023**)
  Deep Generative Models for Health Workshop NeurIPS 2023. *(Poster)*
- **Propensity Weighted federated learning for treatment effect estimation in distributed imbalanced environments**
  Almodóvar, A., Parras, J., Zazo, S. (**2024**)
  Computers in Biology and Medicine, vol, 178, pp. 108779.
  - Journal metrics (2023): IF 7.0, Rank Q1 (94.0 in Biology, 89.6 in Computer Science, Interdisciplinary Applications, 87.3 in Engineering, Biomedical, 93.6 in Mathematical & Computational Biology)
- **DeCaFlow: A Deconfounding Causal Generative Model**
  Almodóvar, A., , Javaloy, A., Parras, J., Zazo, S., & Valera, I. (**2025**)
  ArXiv preprint 2503.15114

Professional Experience

Teacher assistant | *Universidad Politécnica de Madrid* Sept. 2022 – Apr. 2024

- Courses: Digital Signal Processing | Probability and Random Signals | Advanced Data and Signal Processing
- One supervised Master's Thesis in Knowledge Graphs
- 72 hours in total

PhD student grant (Programa Propio UPM) | *Universidad Politécnica de Madrid* Feb. 2023 – Apr. 2024

Assistant Professor | *Universidad Politécnica de Madrid* Apr. 2024 – Present

- Courses: Digital Signal Processing | Probability and Random Signals | Advanced Data and Signal Processing
- Two supervised Master's Thesis in Deep Survival Analysis
- 120 teaching hours

Talks

Seminar | Machine learning e Inteligencia artificial: aplicaciones y retos futuros March 2023
Asociación para el Desarrollo de la Ingeniería de Organización (ADINGOR)| Madrid | Spanish

Conference | Causal estimation of treatment effects in a federated environment June 2023
Young Scientists Open Meetings (YSOM) | Madrid | English

Poster | Federated learning for Causal inference in imbalanced environments December 2023
Neural Information Processing Systems (NeurIPS 2023) | New Orleans | English

Seminar | Generative models for causal inference July 2024
Great Talks: Genuine Research Talks @ Teleco| Madrid | English

Seminar | AI introduction: present and future July 2024
Merck Sharp and Dohme Spain| Madrid | Spanish

Projects

Genomed4all | European Comission Jan. 2022 – Jan. 2025
Federated learning platform for medical data processing

MadridDataSpace4Pandemics | Community of Madrid Jan. 2022 – Dec. 2023
Causal inference for treatment effect estimation in COVID-19

REPO4EU: Precision Drug Repurposing for Europe and the World | European Comission Sept. 2022 – Present
Knowledge graph for drug repurposing

Synthema | European Comission Dec. 2022 – Present
Treatment effect prediction for survival analysis

Synthia | European Comission Sep. 2024 – Present
Synthetic control arm