# ARTUR XARLES ESPARRAGUERA

DATA SCIENTIST / COMPUTER VISION ENGINEER

## PERSONAL INFO


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www.linkedin.com/in/arturxe

https://github.com/arturxe2


## LANGUAGES

- Catalan (mother tongue)
- Spanish (mother tongue)
- English

## SKILLS

- R
- Python
- SQL
- Power BI
- Machine Learning
- Deep Learning
- PyTorch
- Transformers

## PROFESSIONAL INTERESTS

- Data Science in Sports
- Computer Vision
- Temporal Action Localization
- Action Spotting
- Self-supervised Learning

## EDUCATION

**PhD in Computer Science - Temporal Action Detection in Sports Videos**

Universitat de Barcelona | 2023 - Present

**This thesis aims to develop and explore methodologies for video analysis using deep learning models, with a primary focus on action detection in sports videos.**

## • PROJECTS

Discriminability Enhancement for Action Spotting

This project focuses on improving discriminability among concurrent temporal feature vectors to enhance the precision of methodologies for action localization tasks. We achieve this through a convolutional-based layer designed for this purpose. Furthermore, we employ an encoder-decoder architecture to capture features across various temporal scales, which helps detecting actions requiring different temporal contexts. We evaluate our approach on four distinct sports datasets.

**(ongoing research)**

ASTRA: An Action Spotting Transformer for Soccer Videos

In this project, we focused on addressing several challenges regarding the task of Action Spotting in soccer matches, including the requirement for precise action localization, the presence of long-tail data distribution, non-visibility in certain actions, and inherent label noise. To do so, our method incorporated (a) a Transformer encoder-decoder architecture to achieve the desired output temporal resolution and produce precise predictions, (b) a balanced mixup strategy to handle long-tail data distribution of the data, (c) an uncertainty-aware displacement head to capture the ground-truth labels variability, and (d) input audio signal to enhance detection of nonvisible actions.

**(Publication: Xarles, A., et al. (2023, October). ASTRA: An Action Spotting TRAnsformer for Soccer Videos. In Proceedings of the 6th International Workshop on Multimedia Content Analysis in Sports (pp. 93-102).)**

Video-based Skill Assessment for Golf

This project focused on automating golf player skill assessment through computer vision techniques applied to video analysis. We used pre-trained deep learning models to address challenges stemming from limited dataset size while investigating various approaches including regression, ranking, and classification to produce per-player predictions.

**(Publication: Ingwersen, C. K., Xarles, A., et al. (2023, October). Video-based Skill Assessment for Golf: Estimating Golf Handicap. In Proceedings of the 6th International Workshop on Multimedia Content Analysis in Sports (pp. 31-39).)**

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### Master Degree in Data Science

Universitat de Barcelona | 2021 - 2022

- **MASTER'S THESIS**

**Transformer-based Action Spotting in soccer videos:** action spotting in football videos through computer vision techniques. Among others, descriptors extraction through the fine-tuning of already pre-trained models and a hierarchical multimodal transformer-based classifier.

**(2nd Catalonia Award by the Catalan Association on Artificial Intelligence)**

**(Publication: Silvio Giancola et al. (2022) SoccerNet 2022 Challenges Results. MMSports '22. https://doi.org/10.1145/3552437.3558545)**

### Bachelor Degree in Applied Statistics

Universitat Autònoma de Barcelona | 2017 - 2021

- Average grade: 9,21
- MH in: Unsupervised Learning, Machine Learning 1, Time Series and, Simulation and Resampling, among others.

- **BACHELOR'S THESIS**

**Statistical tools in sports results modelling:** the aim of this project was to fit a generalized bivariate Poisson model to a large dataset of football match results and many explanatory variables using the expectation-maximization algorithm, among other supervised statistical learning methods.

**(SEA-Anna Espinal Award by the Societat Catalana d'Estadística)**

**(Oral presentation in the XXI Dia de l'Estadística de Catalunya)**

## PROFESSIONAL EXPERIENCE

### Data Science Intern

Accenture | November 2021 - June 2022

Internship in Accenture as a member of the Procurement Applied Intelligence team. Tasks realized:

- Data model management.
- Development of ML algorithms to improve procurement management. Among others, an NLP algorithm for Supplier name normalization.
- Development of PowerBI and Toucan Toco visualizations for Procurement data analysis.

### Junior Software Engineer

Computer Vision Center (CVC) | September 2022 - June 2023

Junior software engineer position in CVC working on a project related to Human Behavior Understanding on Sports Videos. Tasks realized:

- Research on the following topics: Self-Supervised Learning, Long-Tail Data and Video Understanding, among others.
- Development of an Action Spotting algorithm for Soccer videos.