

# ARTUR XARLES ESPARRAGUERA

## Computer Vision PhD Student

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## EDUCATION

PhD in Computer Science – Temporal Action Detection in Sports Videos

Universitat de Barcelona (UB)

February 2023 – Present

Summer schools: ICVSS'24.

### Main projects

- T-DEED: Temporal-Discriminability Enhancer Encoder-Decoder for Precise Event Spotting in Sports Videos.

In this project, we focused on the task of Precise Event Spotting, with the main contribution of promoting the discriminability of temporal features within the same clip. This approach improves precision in action localization. We achieved this through a specialized convolutional layer and utilizing an encoder-decoder architecture to capture features across multiple temporal scales, which proved effective in detecting actions requiring diverse temporal contexts. Our method achieved state-of-the-art (SOTA) results on four different sports datasets and secured 1st place in the 2024 SoccerNet Ball Action Spotting challenge.

- 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.

### Master Degree in Data Science

Universitat de Barcelona (UB)

September 2021 – July 2022

Average score: 9.10

### Master's thesis

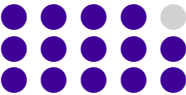
- Transformer-based Action Spotting in soccer videos.

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

2nd Catalonia Award by the Catalan Association on Artificial Intelligence.

## LANGUAGES

English  
Catalan  
Spanish



## SKILLS

Python

PyTorch

OpenCV

PowerBI

Transformers

Video Understanding

Deep Learning

R

## PROFESSIONAL INTERESTS

Application of Computer Vision in Sports

Temporal Action Localization and Action Spotting

Self-Supervised Learning

Sports Analytics

## PUBLICATIONS

### Journal Articles

- A. Cioppa, S. Giancola, V. Somers, et al., "SoccerNet 2023 challenges results," *Sports Engineering*, vol. 27, no. 2, p. 24, 2024.

### Conference Proceedings

- A. Xarles, S. Escalera, T. B. Moeslund, and A. Clapés, "T-deed: Temporal-discriminability enhancer encoder-decoder for precise event spotting in sports videos," in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops*, 2024, pp. 3410–3419.
- C. K. Ingwersen, A. Xarles, A. Clapés, et al., "Video-based skill assessment for golf: Estimating golf handicap," in *Proceedings of the 6th International Workshop on Multimedia Content Analysis in Sports*, 2023, pp. 31–39.

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## Bachelor Degree in Applied Statistics

Universitat Autònoma de Barcelona (UAB)

📅 September 2017 – July 2021

Average score: 9.21

### Bachelor's thesis

- Statistical tools in sport results modeling.

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.

## EXPERIENCE

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### Junior Software Engineer

Computer Vision Center (CVC)

📅 September 2022 – June 2023   📍 Barcelona

- Junior software engineer position in CVC working on a project related to Human Behavior Understanding on Sports Videos.
- Research on the following topics: Self-Supervised Learning, Long-Tail Data and Video Understanding.
- Development of an Action Spotting algorithm for Soccer videos.

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### Data Science Intern

Accenture

📅 November 2021 – June 2022   📍 Barcelona

- Internship as a member of the Procurement Applied Intelligence team.
- Data model management.
- Development of ML algorithms to improve procurement management. Among others, NLP algorithm for Supplier name normalization.
- Development of PowerBI visualizations for Procurement data analysis.

- A. Xarles, S. Escalera, T. B. Moeslund, and A. Clapés, "Astra: An action spotting transformer for soccer videos," in *Proceedings of the 6th International Workshop on Multimedia Content Analysis in Sports*, 2023, pp. 93–102.
- S. Giancola, A. Cioppa, A. Deliège, et al., "Soccernet 2022 challenges results," in *Proceedings of the 5th International ACM Workshop on Multimedia Content Analysis in Sports*, 2022, pp. 75–86.

## TEACHING

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24/25. Advanced Algorithms (Bachelor in Computer Science, UB).

24/25 & 23/24. Programming Languages II (Bachelor in Computer Science, UB).

## SUPERVISION

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Mohamad Dalal (2024). Master's project on Soccer Action Anticipation.