



SoccerNet

Building the largest and most comprehensive open-source dataset and benchmark for sports video analysis

Anthony Cioppa, Montefiore, ULiège
Silvio Giancola, CoE GenAI, KAUST
Marc Van Droogenbroeck, Montefiore, ULiège

www.soccer-net.org

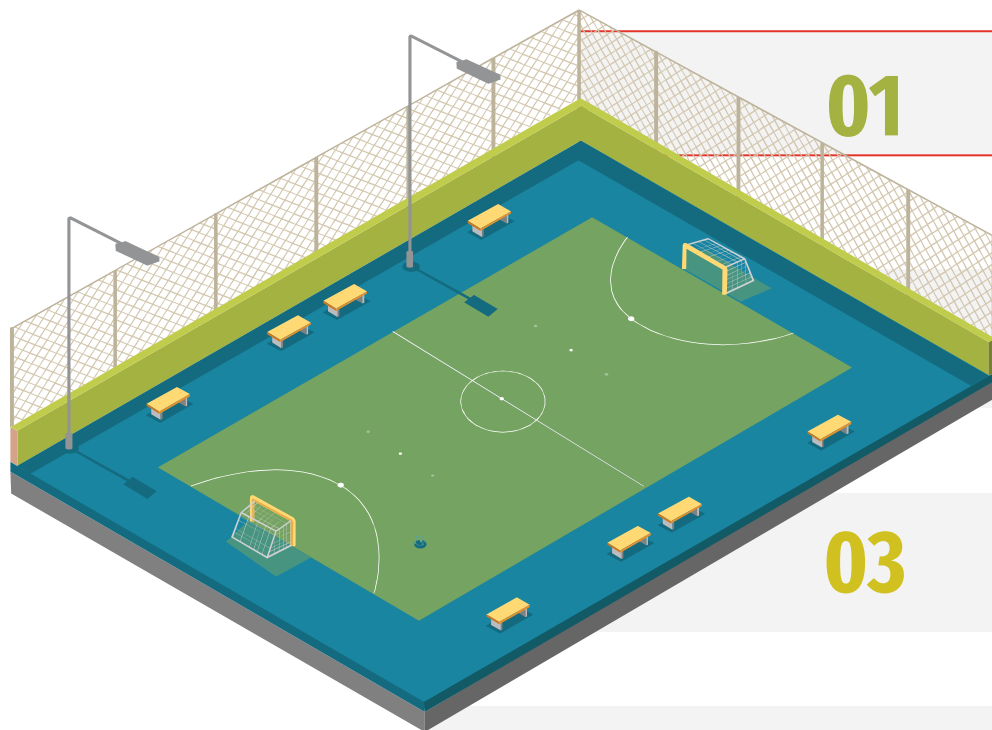




The **largest** and most **comprehensive** collection
of
datasets, **baselines/methods**, and **benchmarks**
for
soccer video analysis (and sports !)



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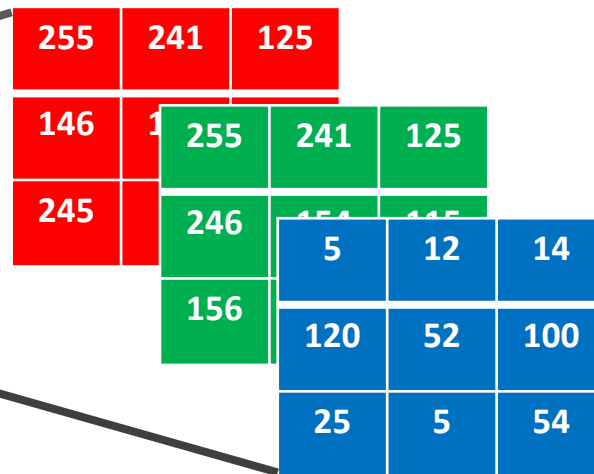
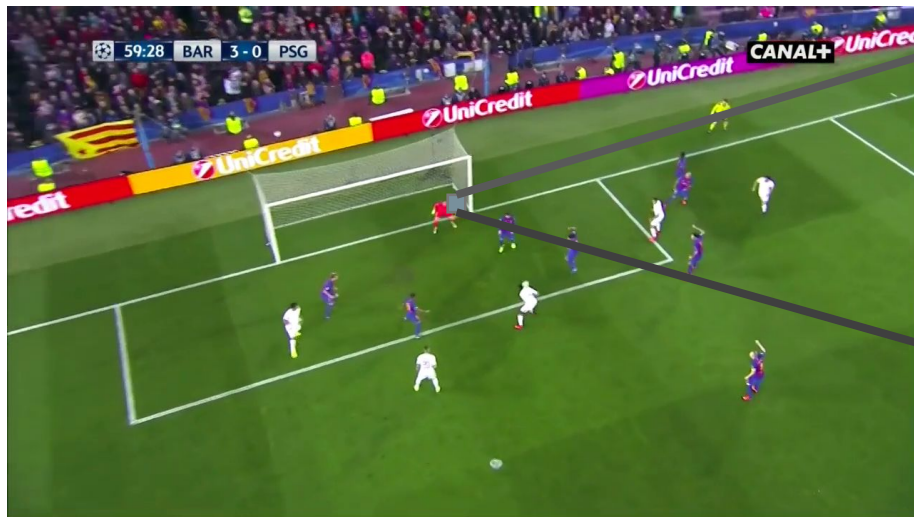
03

Organizing events for the community

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Academic and industrial impact

Computer Vision basics



Why Video Understanding for Soccer?



Player scouting



Automatic highlights



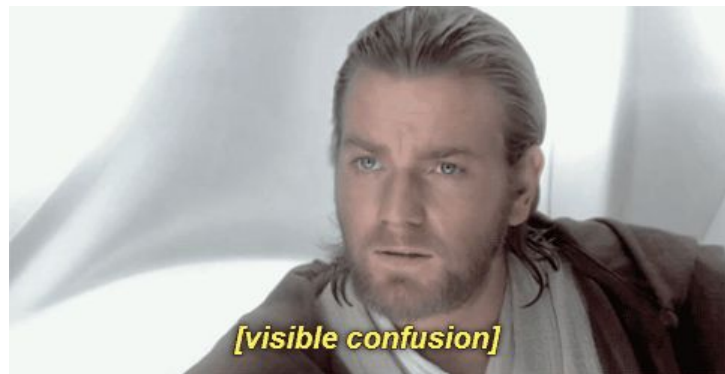
Medical analysis

- Several other applications:

- Action localization: *at what time does a goal/substitution occurs?*
- Video retrieval: *find games where Ronaldo scored from a free kick.*
- Extended statistics: *how many goal Ronaldo scored last season?*

The need for a benchmark

- Lack a public large scale dataset on soccer video.
- Previous research only evaluate on private data.
- Impossible to compare nor benchmark methods.



Data-driven approaches



Algorithm



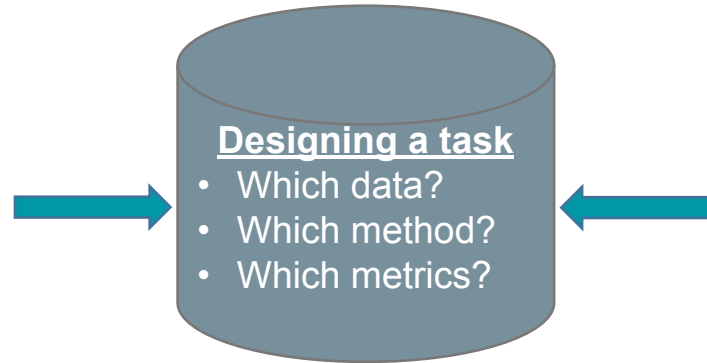
Understanding the needs



Industrial needs

- Developing know-how
- Market openings
- Product potential

...



Research needs

- Research questions
- Transferability to other fields
- Publication potential

...

SoccerNet - Origins



- Started in 2018
- **500 Games** (764h of videos)
- 6 main European Leagues

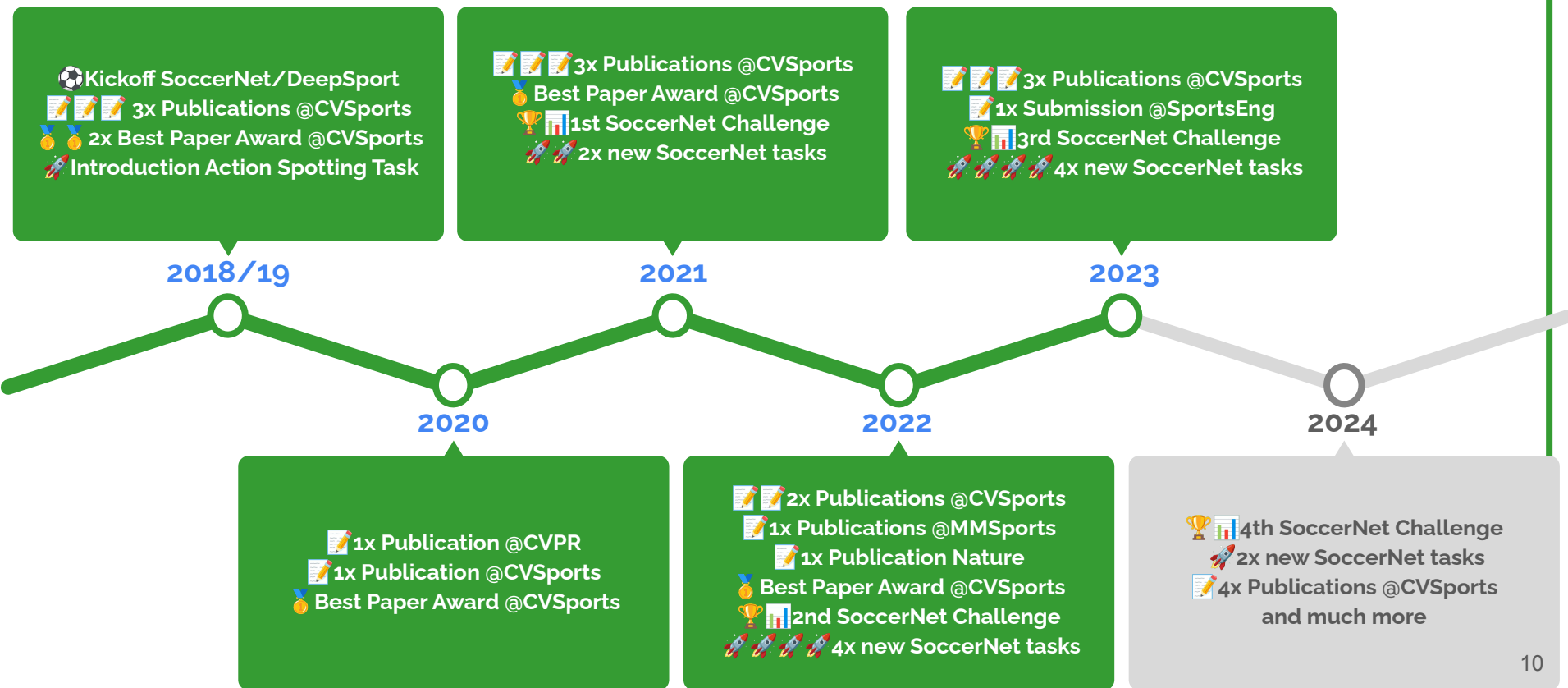


Annotations focus on 3 main events:

- Goal: instant the ball crosses the goal line
 - Card: instant the referee shows a card
 - Substitution: instant a new player enters the field
- Approximately **6000 events** annotated by us in a few weeks
- **Action Spotting** task defined for research



SoccerNet Roadmap



Overview of the publications



1. Hassan Mkhallati*, Anthony Cioppa*, Silvio Giancola*, Bernard Ghanem, Marc Van Droogenbroeck, [SoccerNet-Caption: Dense Video Captioning for Soccer Broadcasts Commentaries](#), CVSports Workshop (CVPRW 2023) **[Oral]**
2. Jan Held*, Anthony Cioppa*, Silvio Giancola*, Abdullah Hamdi, Bernard Ghanem, Marc Van Droogenbroeck, [VARS: Video Assistant Referee System for Automated Soccer Decision Making from Multiple Views](#), CVSports Workshop (CVPRW 2023)
3. Silvio Giancola*, Anthony Cioppa*, Julia Georgieva, Johsan Billingham, Andreas Serner, Kerry Peek, Bernard Ghanem, Marc Van Droogenbroeck, [Towards Active Learning for Action Spotting in Association Football Videos](#), CVSports Workshop (CVPRW 2023)
4. Silvio Giancola*, Anthony Cioppa*, Adrien Delière, Floriane Magera, Vladimir Somers, Le Kang, Xin Zhou, Olivier Barnich, Christophe De Vleeschouwer, Alexandre Alahi, Bernard Ghanem, Marc Van Droogenbroeck, et. al., [SoccerNet 2022 Challenges Results](#), MMSports'22
5. Anthony Cioppa*, Adrien Delière*, Silvio Giancola*, Bernard Ghanem, and Marc Van Droogenbroeck, [SoccerNet-v3 - Scaling up SoccerNet with Multi-View Spatial Localization and Re-Identification](#), Nature Scientific Data 2022
6. Anthony Cioppa*, Silvio Giancola*, Adrien Delière*, Le Kang*, Xin Zhou*, Zhiyu Cheng, Bernard Ghanem, Marc Van Droogenbroeck, [SoccerNet-Tracking: Multiple Object Tracking Dataset and Benchmark in Soccer Videos](#), CVSports Workshop (CVPRW 2022) **[Oral]** **[Best Paper Award]**
7. Renaud Vandeghen, Anthony Cioppa, Marc Van Droogenbroeck [Semi-Supervised Training to Improve Player and Ball Detection in Soccer](#), CVSports Workshop (CVPRW 2022)
8. Silvio Giancola and Bernard Ghanem, [Temporally-Aware Feature Pooling for Action Spotting in Soccer Broadcasts](#), CVSports Workshop (CVPRW 2021)
9. Adrien Delière*, Anthony Cioppa*, Silvio Giancola*, Meisam Jamshidi*, Jacob Dueholm*, Kamal Nasrollahi, Bernard Ghanem, Thomas B. Moeslund, Marc Van Droogenbroeck, [SoccerNet-v2: A Dataset and Benchmarks for Holistic Understanding of Broadcast Soccer Videos](#), CVSports Workshop (CVPRW 2021) **[Best Paper Award]**
10. Anthony Cioppa*, Adrien Delière*, Floriane Magera*, Silvio Giancola*, Olivier Barnich, Bernard Ghanem, Marc Van Droogenbroeck, [Camera Calibration and Player Localization in SoccerNet-v2 and Investigation of their Representations for Action Spotting](#), CVSports Workshop (CVPRW 2021)
11. Anthony Cioppa, Adrien Deliege, Noor Ul Huda, Rikke Gade, Marc Van Droogenbroeck, Thomas B Moeslund, [Multimodal and multiview distillation for real-time player detection on a football field](#), CVSports Workshop (CVPRW 2020) **[Best Paper Award]**
12. Anthony Cioppa*, Adrien Delière*, Silvio Giancola*, Bernard Ghanem, Marc Van Droogenbroeck, Rikke Gade, Thomas Moeslund, [A Context-Aware Loss Function for Action Spotting in Soccer Videos](#), Conference on Computer Vision and Pattern Recognition (CVPR 2020)
13. Anthony Cioppa, Adrien Deliege, Maxime Istasse, Christophe De Vleeschouwer, Marc Van Droogenbroeck, [Arthus: Adaptive real-time human segmentation in sports through online distillation](#), CVSports Workshop (CVPRW 2019) **[Best Paper Award]**
14. Silvio Giancola, Mohieddine Amine, Tarek Dghaily, Bernard Ghanem, [SoccerNet: A Scalable Dataset for Action Spotting in Soccer Videos](#), IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPRW 2018) **[Oral]**
15. Anthony Cioppa, Adrien Delière, Marc Van Droogenbroeck, [A bottom-up approach based on semantics for the interpretation of the main camera stream in soccer games](#), CVSports Workshop (CVPRW 2018) **[Best Paper Award]**
16. **and much more...**

The SoccerNet team



AALBORG UNIVERSITY



 Marc Van Droogenbroeck Professor at ULiège (Belgium) Lead supervisor	 Adrien Delille Postdoc Researcher at KAUST (Saudi Arabia) (Belgium) Lead organizer	 Silvio Giancola Research Scientist at KAUST (Saudi Arabia) (Belgium) Lead organizer	 Anthony Cloppa Postdoc Researcher at ULiège (Belgium) Lead organizer	 Bernard Chaben Associate Professor at KAUST (Saudi Arabia) Lead supervisor	
 Meisam Jamshidi Seikavandi PhD Fellow at IT University of Copenhagen (Denmark) Lead researcher on the grounding task	 Jacob V. Dueholm PhD Candidate at Aalborg University (Denmark) Lead researcher on the camera task	 Kamal Nasrollahi Aalborg University/ Mitech Systems (Denmark) Supervisor on the spotting and grounding tasks	 Thomas B. Moenchund Professor at Aalborg University (Denmark) Supervisor on the spotting and grounding tasks	 Vladimir Somers PhD Fellow at UCLouvain, EPFL and M.I. Engineer at SpotScribe (Belgium, Switzerland) Lead researcher on the re-identification task	 Floriane Mogers Innovation engineer at EVS Broadcast Equipment (Belgium) Lead researcher on the camera collaboration task
 Olivier Barnich Head of Innovation at EVS Broadcast Equipment (Belgium) Supervisor on the camera calibration task	 Zhiyu Cheng Senior Researcher at Baidu Research (USA) Researcher on the tracking task	 Le Kang Senior Researcher at Baidu Research (USA) Researcher on the tracking task	 Xin Zhou Senior Researcher at Baidu Research (USA) Lead researcher on the tracking task	 Hassan Mhallaoui Master Student at Polytech Paris (France) and ULB (Belgium) Lead researcher on the dense video captioning task	 Jan Held Master Student at ULiège Lead researcher on multi-view projects
 Carlos Hinojosa Postdoc Researcher at KAUST (Saudi Arabia) Researcher on sports-related projects and advertisements	 Victor Joo Research Assistant at UCLouvain (Belgium) Lead researcher on the game state reconstruction task	 Seydi Abolhalil Ghazizadeh ICTEAM/ULouvain, FEA, PhD student at KAUST (Belgium) Lead researcher on the game state reconstruction task	 Karolina Siewczyn Senior Researcher at NASK & PhD Candidate at T.B.P.N. (Poland) Lead researcher on the ball action spotting task	 Mateusz Kowalczyk M.I. Engineer at NASK (Poland) Lead researcher on the ball action spotting task	 Zuzanna Miel M.I. Engineer at NASK (Poland) Lead researcher on the ball action spotting task



SYNERGY SPORTS

A division of sportradar

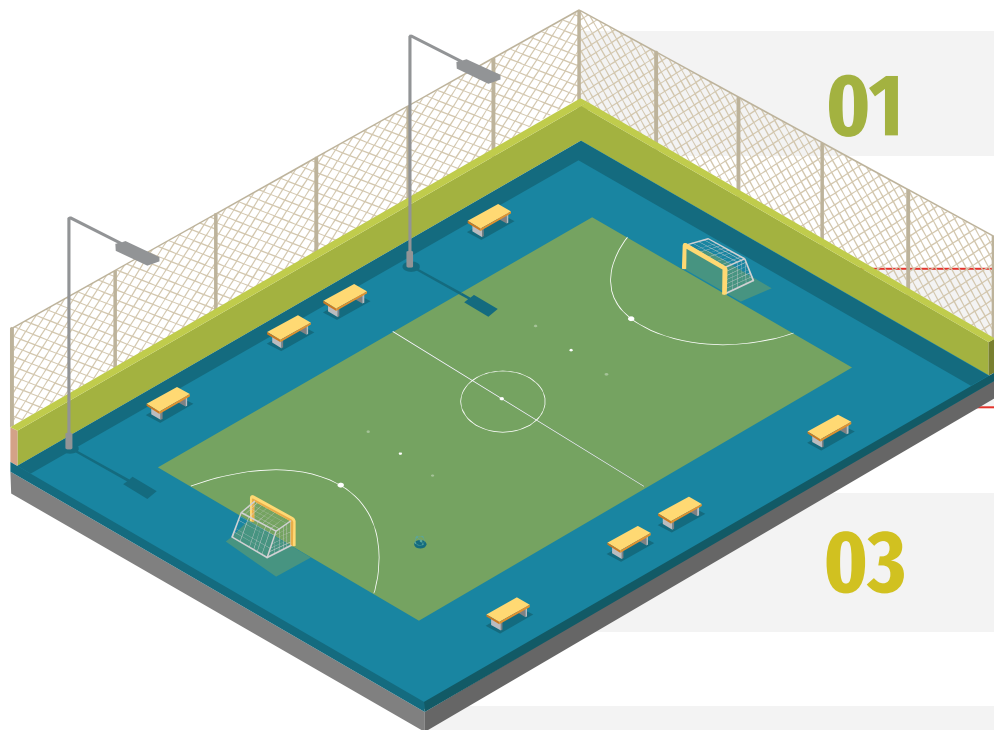


LA LIBERTÉ DE CHERCHER

Collaborative academic and industrial network



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Academic and industrial impact

Socccernet data and annotation summary



Dataset	Year	Tasks	Data	n° annotations
SoccerNet-v1	2018	Action spotting	500 broadcast games*	6,000
SoccerNet-v2	2020-2021	Action spotting Camera shot segmentation Replay grounding	550 broadcast games*	270,000
SoccerNet-v3	2021-2022	Field localization Camera calibration Re-identification Jersey number recognition	34,000 frames	1,400,000
SoccerNet-Tracking	2022	Multi-player tracking	200 clips + 12 single camera games	3,900,000
SoccerNet-Caption	2023	Dense video captioning	550 broadcast games*	36,000
SoccerNet-ball	2023	Ball action spotting	9 broadcast games	50,000
SoccerNet-Depth	2024	Monocular depth estimation	Simulated games	12,400
SoccerNet-GSR	2024	Game state reconstruction	200 clips	9,370,000
TOTAL	2018 –Now	10 different tasks	> 850 hours of videos	>15M annotations

Tasks



APPLICATIONS

DATA

METHOD

EVALUATION

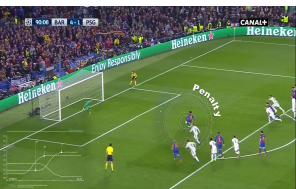
TASK

Overview of some tasks



Broadcast Video Understanding

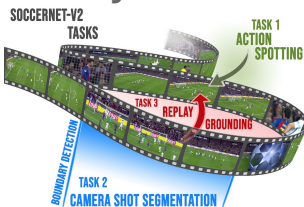
Action Spotting



Ball Action Spotting



Camera Shot Segmentation



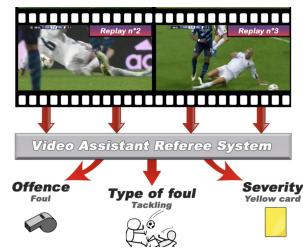
Replay Grounding



Dense Video Captioning

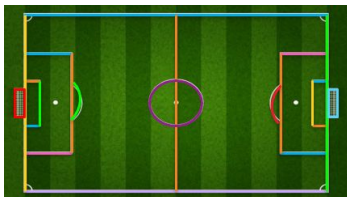


Foul Recognition

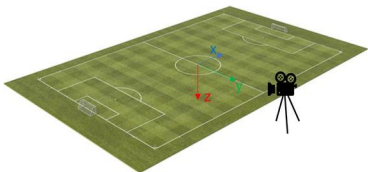


Field Understanding

Field Localization



Camera Calibration

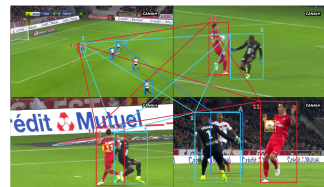


Player Understanding

Player Tracking



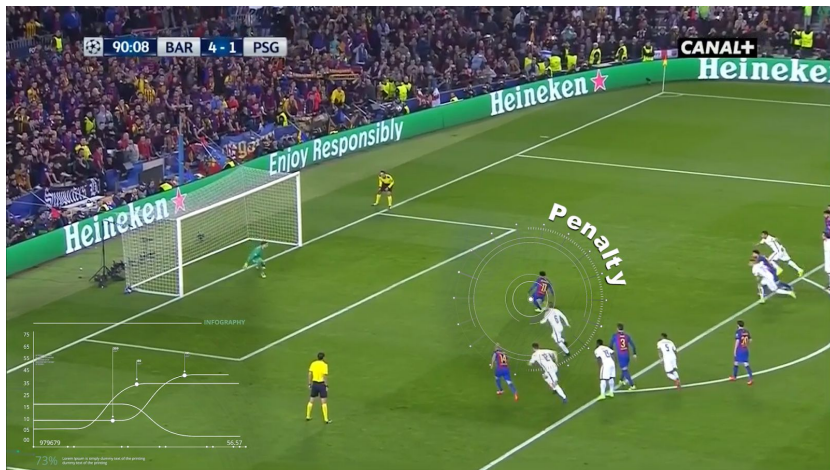
Re-Identification



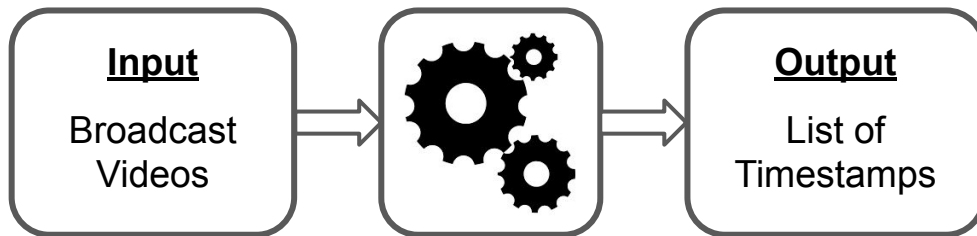
Jersey Number Recognition



Action Spotting



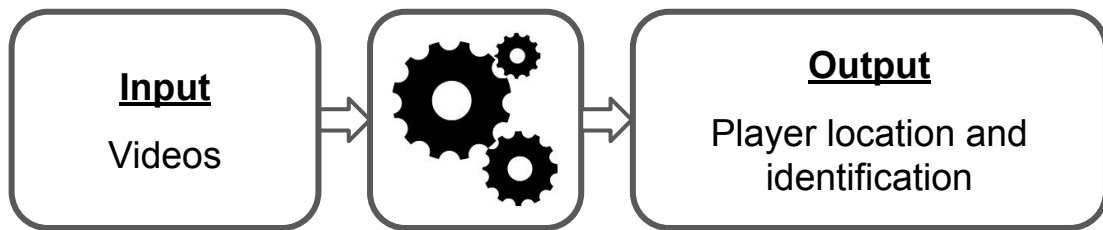
- **Task:** localizing when and which soccer action occurs
- **Data:** 500+50 broadcast games
- **Annotations:** 110,458 annotated timestamps
- **Classes:** 17 events: Penalty, Kick-off, Goal, Substitution, Offside, Shots on target, ...



Game State Reconstruction



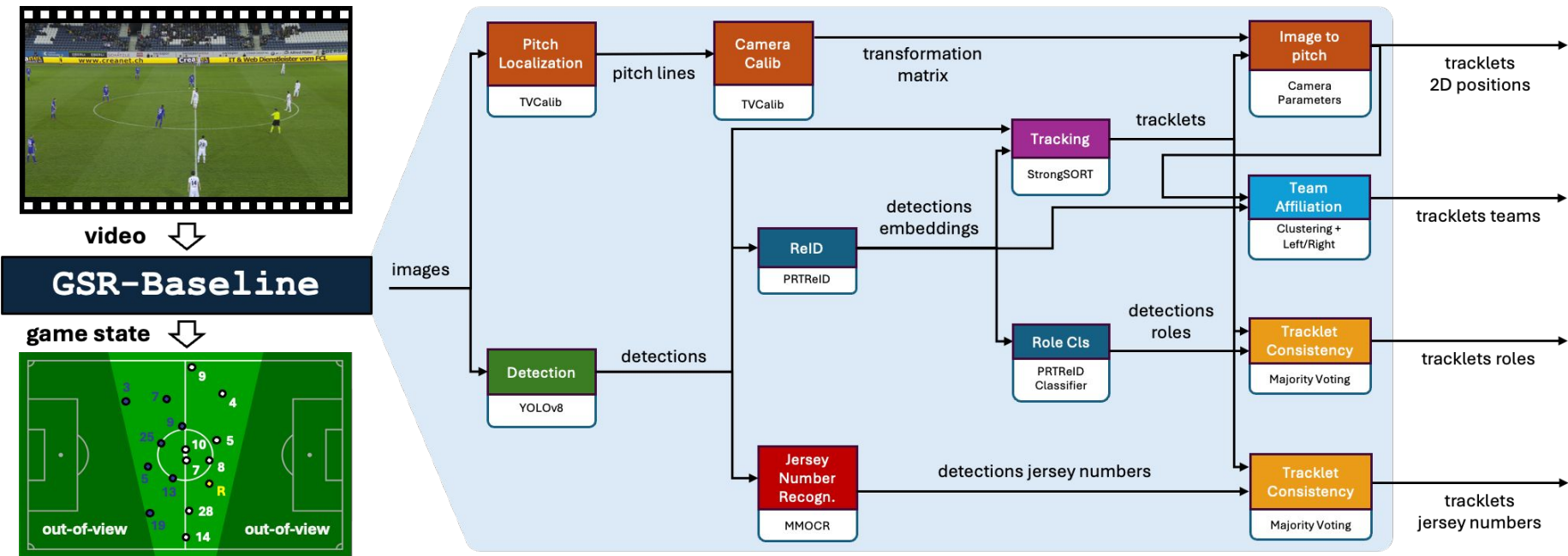
- **Objective** : Obtain a top-view of the field
- **Data** : New annotations of players and lines
- Task combining:
 - Player tracking
 - Re-identification
 - Camera alibration
 - Jersey number recognition
 - Team assignement



Overview of our first baseline for GSR



- Combination of the best methods proposed on SoccerNet tasks



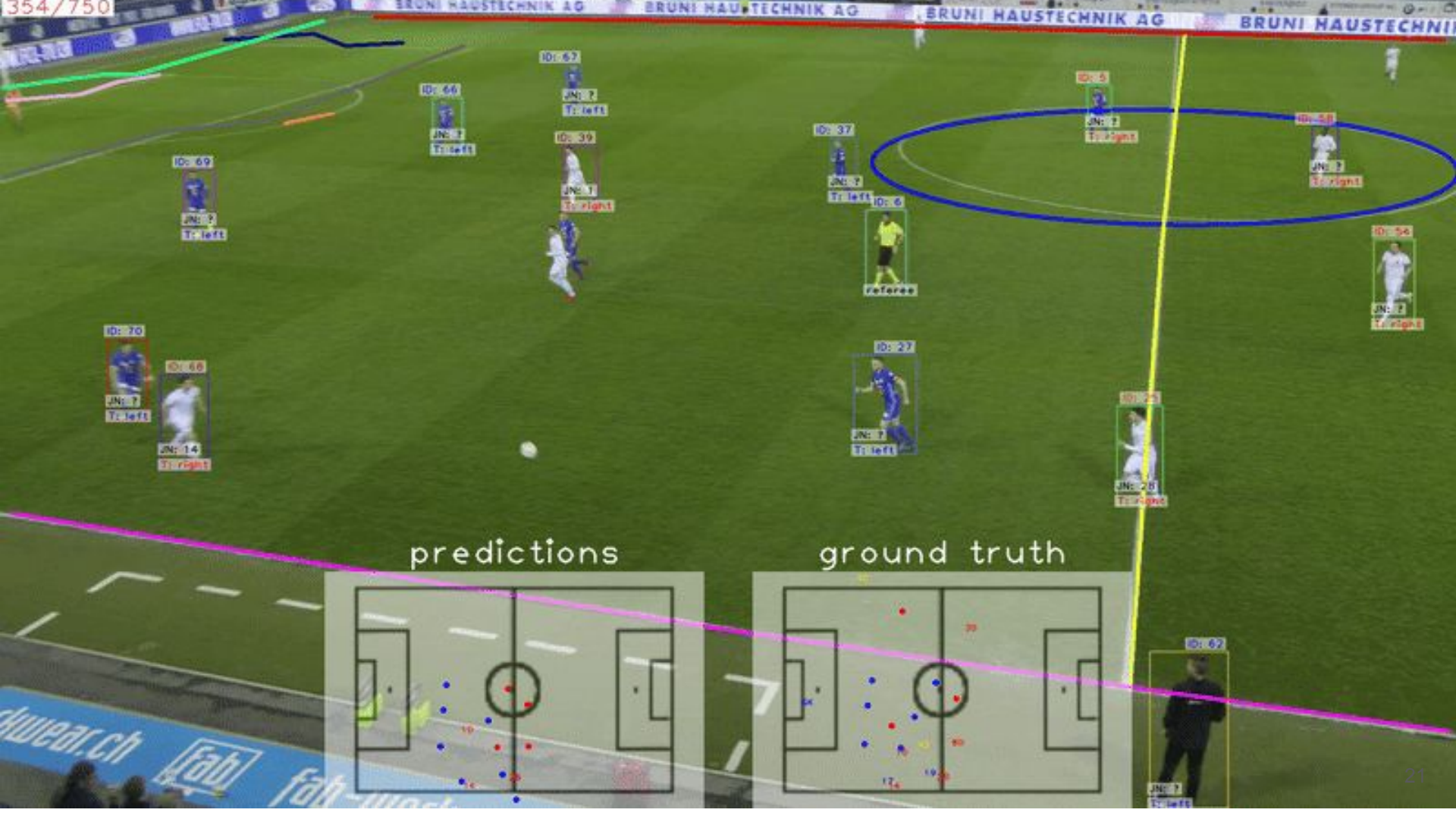
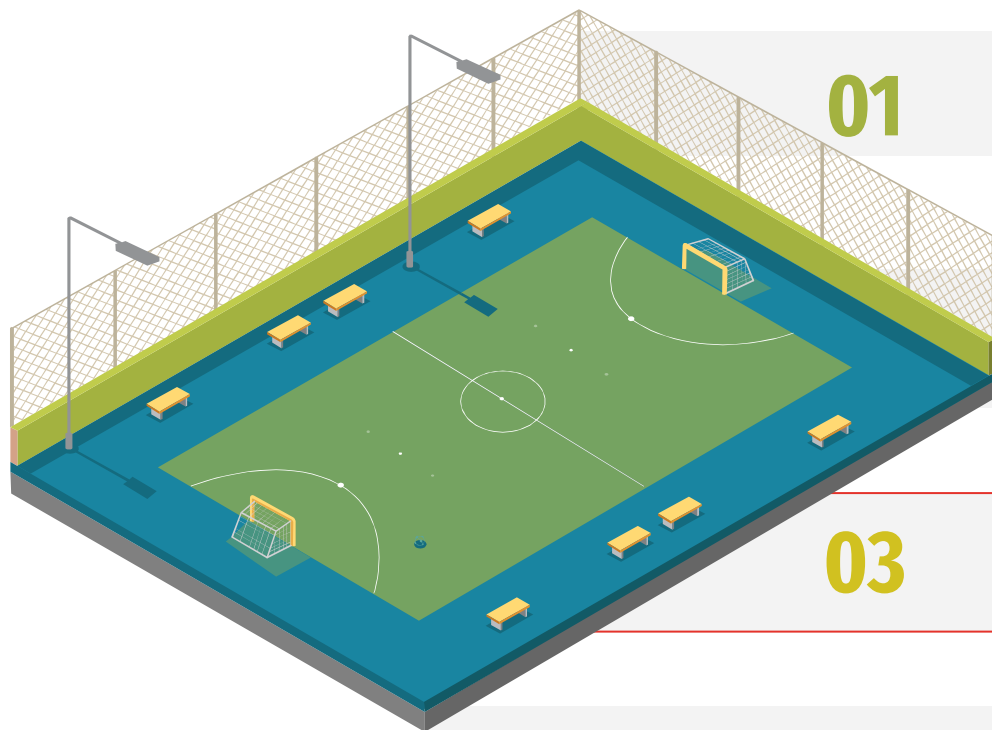


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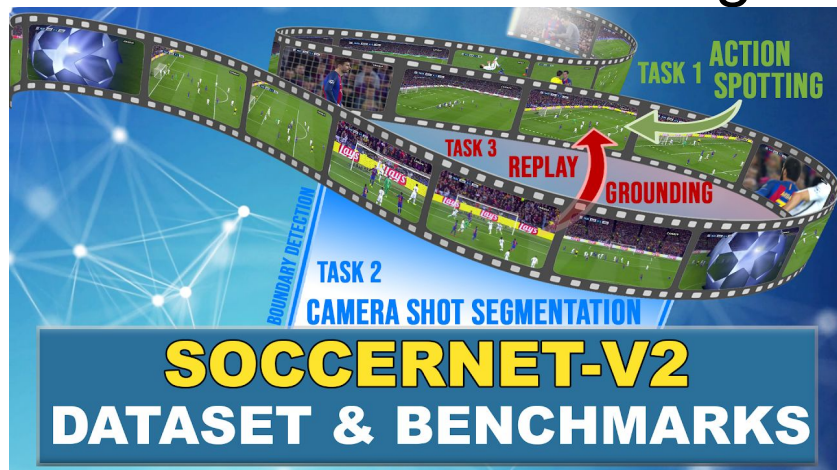
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Academic and industrial impact

Overview of the challenges



General information on the 2024 challenges



- 4 tasks
- 7 coordinators
- 4 sponsors
- 4000\$ of prize
- **From February 1st to May 30th, 2024**

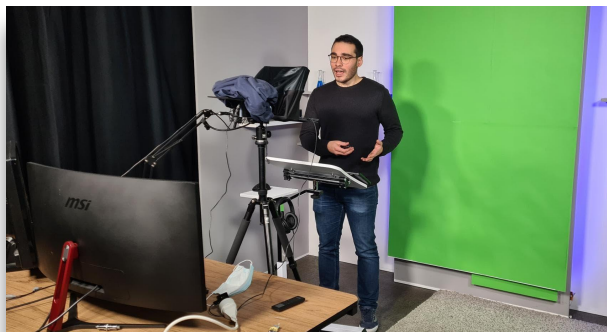


Open-source data
Open-source methods
Open-source benchmarks
Open-source challenges



A unique model !

YouTube: A long-term investment



ACAD Research



Promoting on other media



Vladimir Somers • 1er

Artificial Intelligence & Computer Vision & Deep Learning PhD...

• 1 sem.

🚀 We are thrilled to announce that our paper '*SoccerNet Game State Reconstruction: End-to-End Athlete Tracking and Identification on a Minimap*' has been accepted at **CVSports** and will be presented in Seattle at **CVPR** ...voir plus



👍❤️🔒 Vous et 1488 autres personnes

56 commentaires • 107 republications

❤️ J'adore

💬 Commenter

🔄 Republier

➦ Envoyer

SoccerNet @soccernet_org · Apr 11

👋 Missed our SoccerNet Tutorials live session? No worries! 🚀 Catch the replay now and dive into the insights on SoccerNet Challenges 2024 @CVPR.

🔗 youtu.be/Ir-6D3j_lkA

#CVPR2024 #AI #Sports #Computer #Challenge



🔄 9

❤️ 9

👁️ 3.4K



Leading to invitations to present worldwide

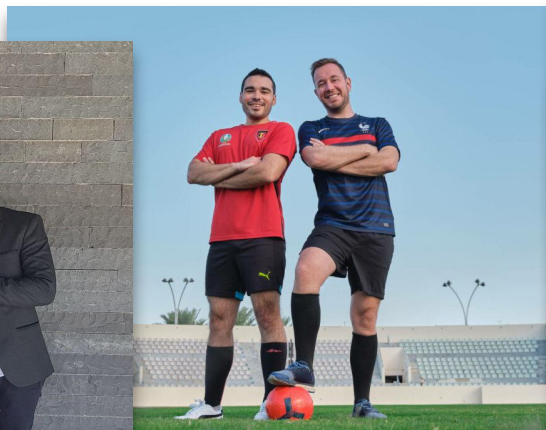
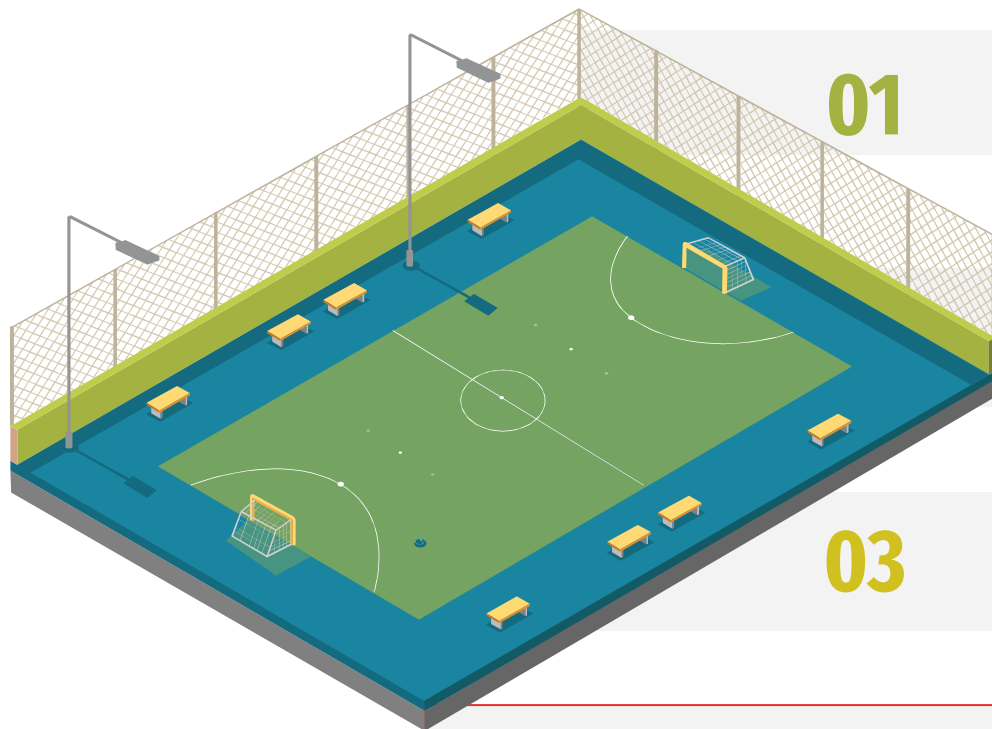


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A much broader impact



Discord community:
1150+ members



YouTube: **40,000+** views
related to SoccerNet



EvalAI: **1500+** submissions
from **134** teams over **3** years!



Email: Address book of
2.000+ actors in sports.

International community

<https://www.soccer-net.org/>

100,000+ visits from 187 countries



Research outcomes



- 30 research papers from our team in top conferences and journals.
- 5 best paper awards
- Collaborations with big industrial actors in sports.
- Collaboration between universities worldwide
- Hundreds of paper citations.
- The go-to dataset for sports video understanding!



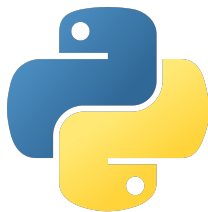
Industrial outcomes



- With all know-how, industrial partners can better understand the challenges and solutions of sports analysis
- Available open-source code that can be integrated in processing pipelines
- When industrial partners have more data to train on, they directly have a competitive advantage



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Python
CPU and
GPU codes
available!

github.com/SoccerNet/

```
pip install soccernet
```



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