Ultimate Frisbee Tactical Dashboard

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- Ultimate Frisbee as a sport
- Business mission
- Product presentation
- Technical insights

- 14 Players
- 2 Referees
- 2 Endzones
- 1 Disc

How to Score?

catch the disc in opposite endzone

Most important rule!

Player in possession of the disc is not allowed to move!

First organized tournament
Eight teams took part in the first National Collegiate Championships [Yale Univeristy]

1975

1968

Joel Silver
introduced his idea of Ultimate Frisbee to the Columbia High School student council

1983

First World Ultimate Championship
Gothenburg, Sweden

World Games
included as a medal sport

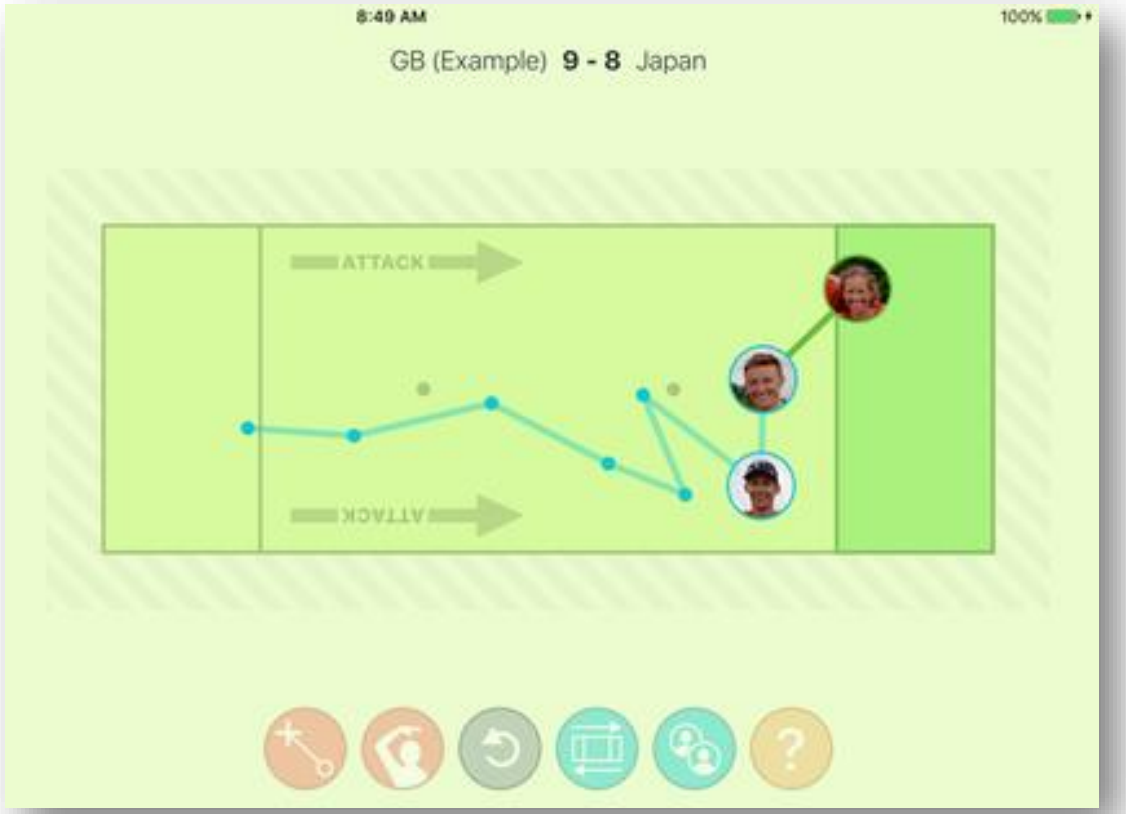
2001

???

Ultimate USA:
- 100.000+ active players

Ultimate Germany:
- 10.000+ active players

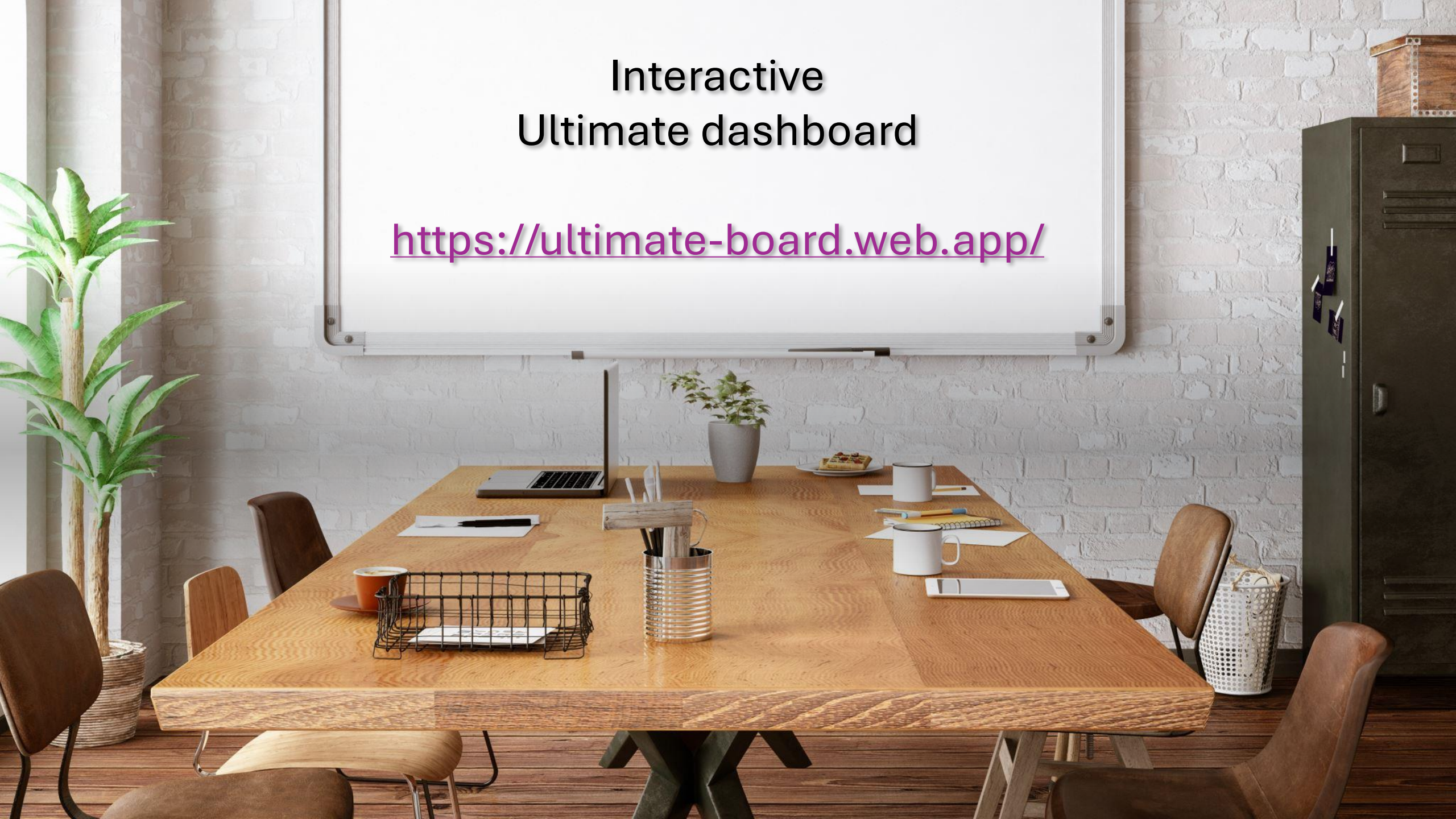
Problem we solved!



Source: https://statto.app/

Tactical positions of the players must be recorded manually by taping on the corresponding location of the pitch.

We automated this step using computer vision and AI


Interactive
Ultimate dashboard
https://ultimate-board.web.app/

Technical Insights

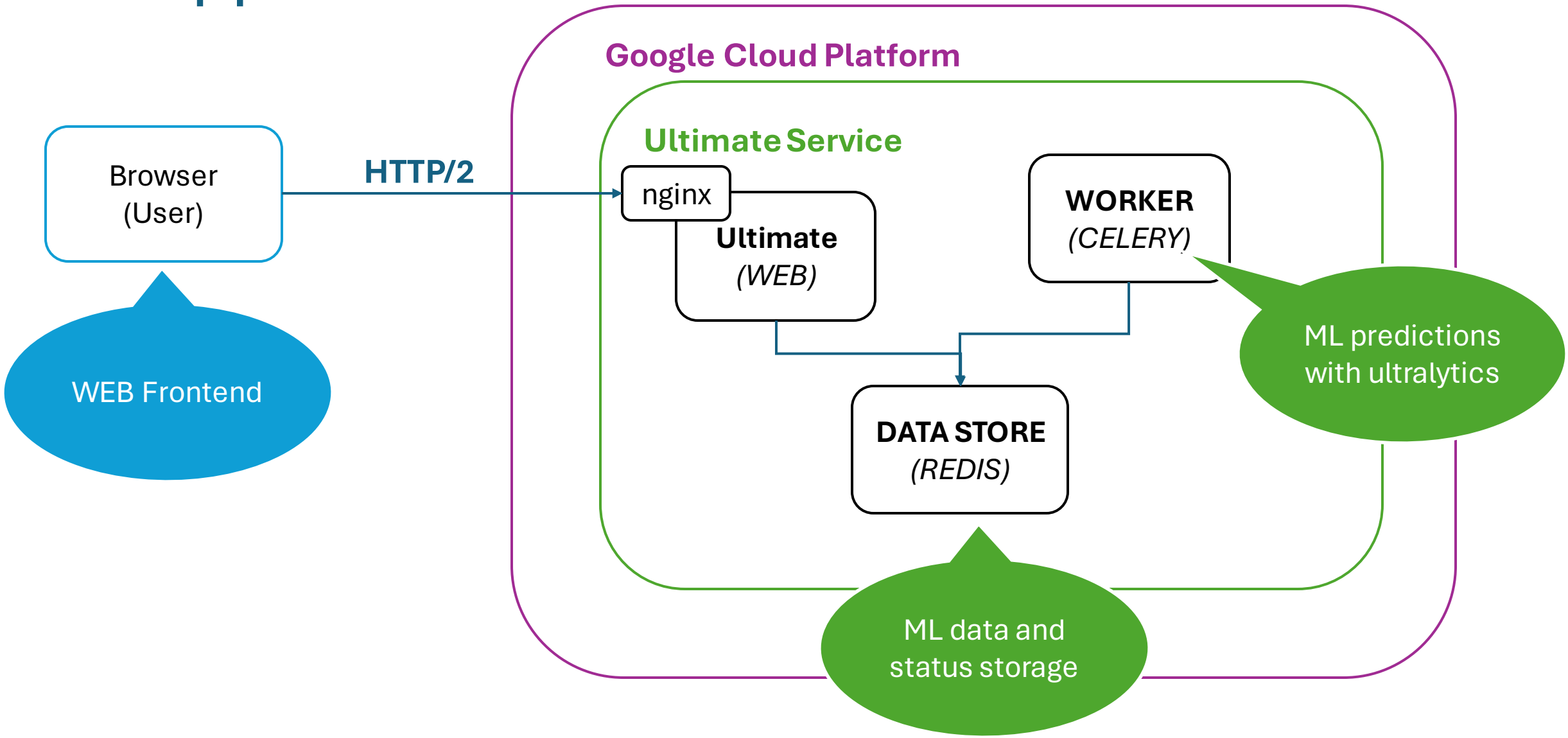
PART I: Web application:

- structure and deployment

PART II: Data Science/ML:

1. Player and disc detection
2. Field outline detection
3. Perspective transformation
4. Team detection

Web application



YOLOv8 object detector

Training data

- Video footage of 4 games
  - **Event:** Club nationals
  - **Year:** 2021
  - **Recorded by:** Benson

- Supervised Learning
  - 200 labeled training images
  - 40 labeled test images

Machine Vs Condors 2021 Club Nationals Pool Play

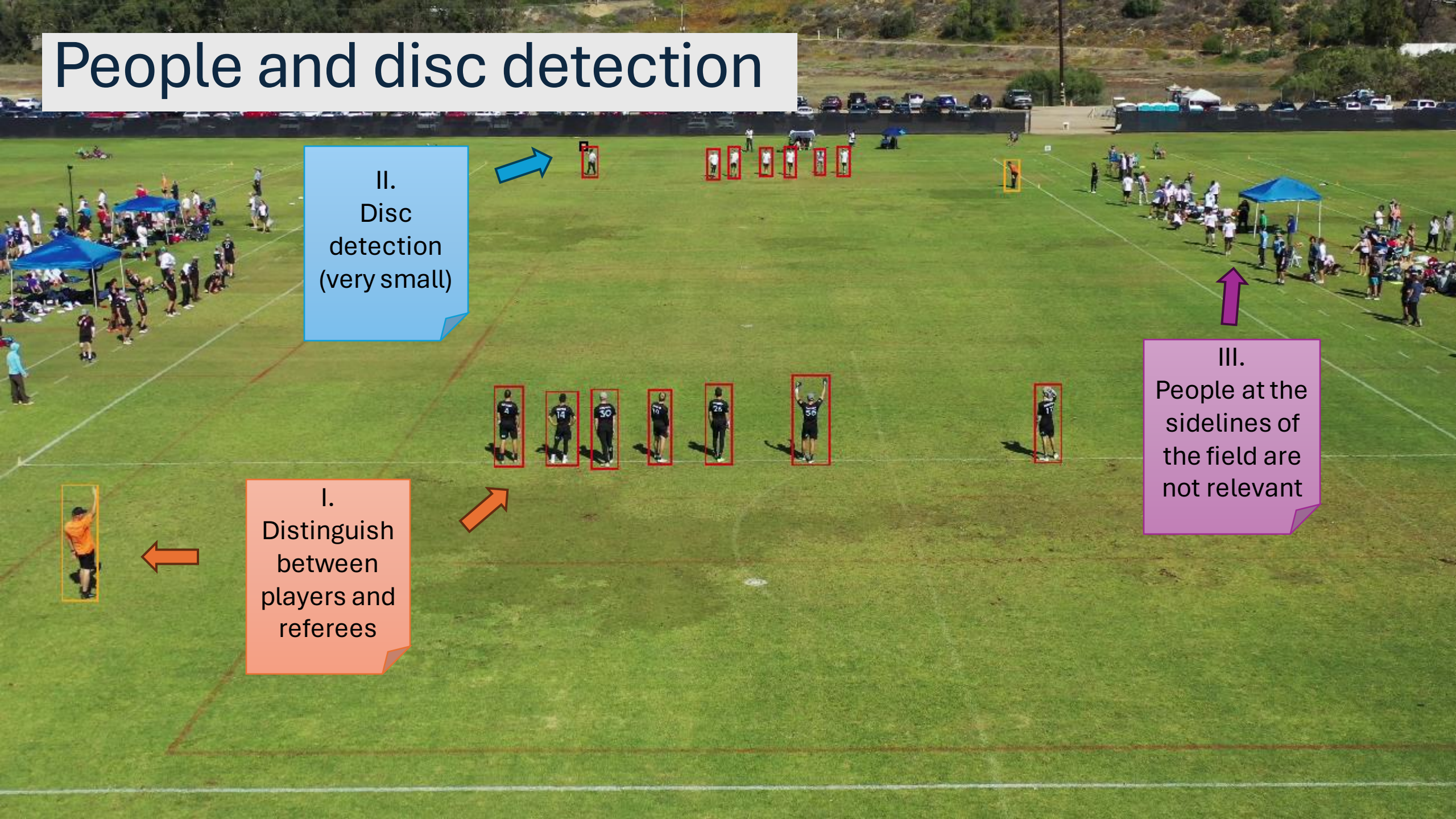
Sockeye Vs Rhino Slam 2021 Club Nationals Pool Play

PoNY Vs The Killjoys 2021 Club Nationals Pool Play

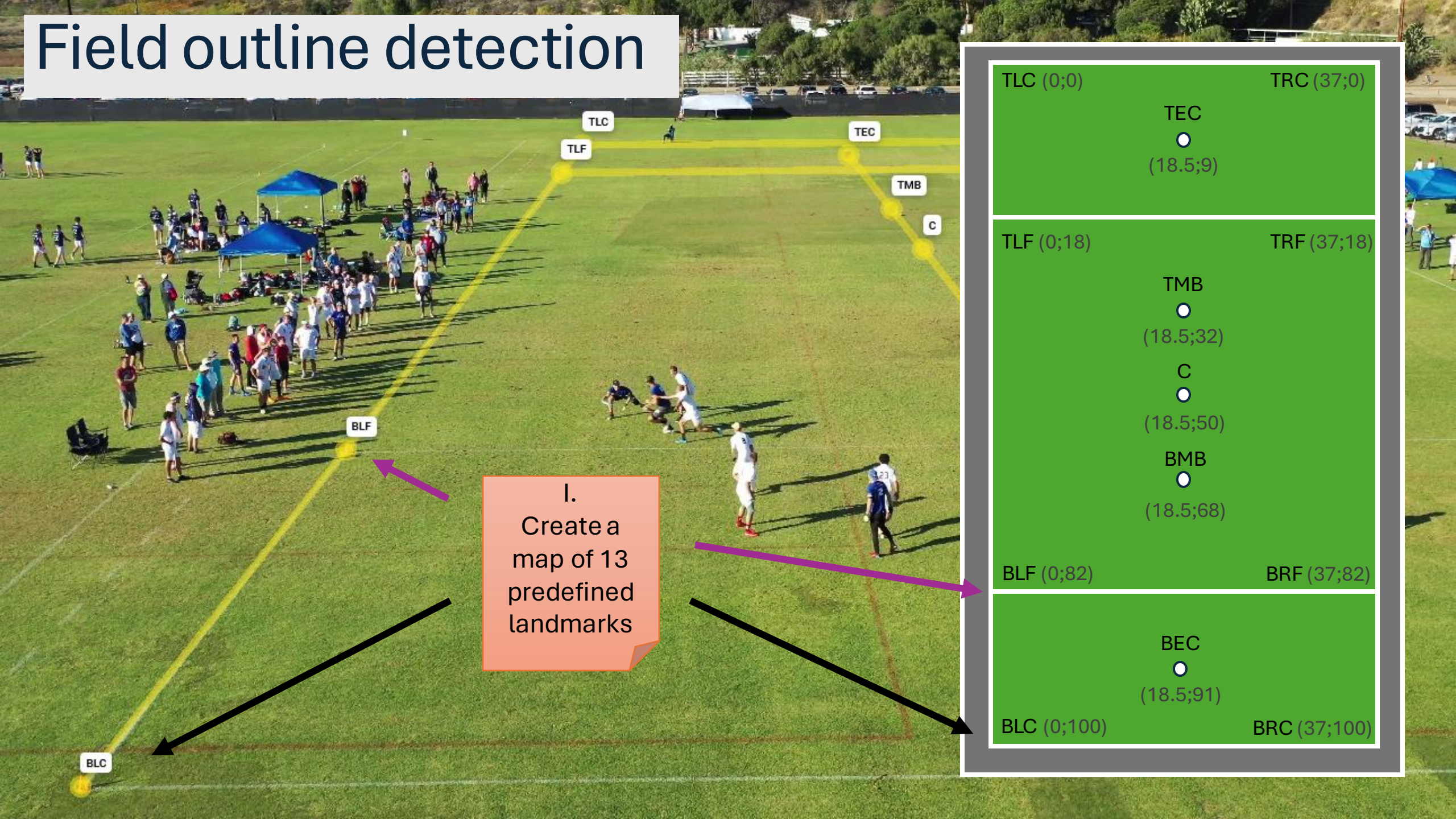
Sub Zero Vs PoNY 2021 Club Nationals Pool Play

Source: https://vimeo.com/user95184899

People and disc detection



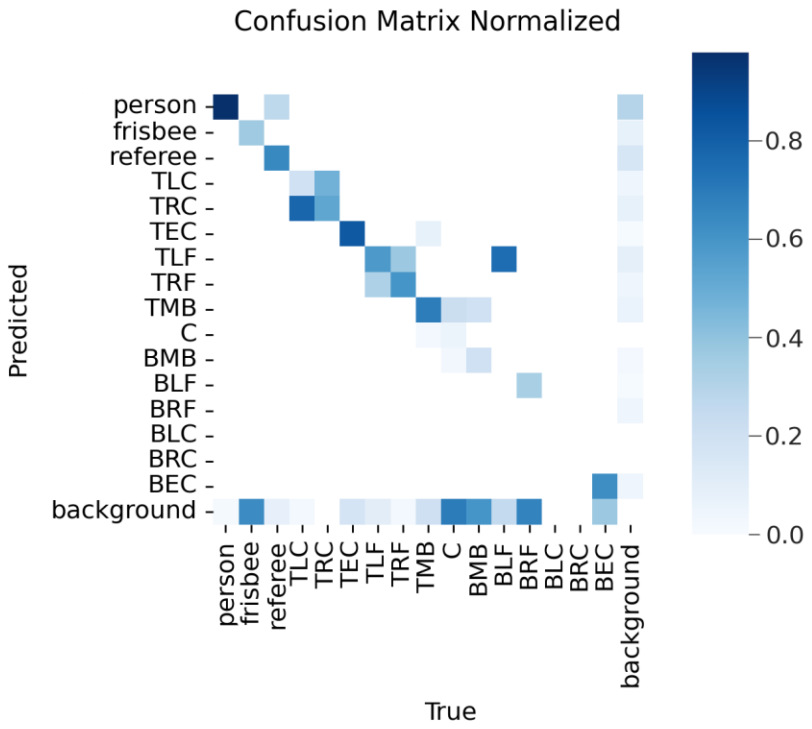
Field outline detection



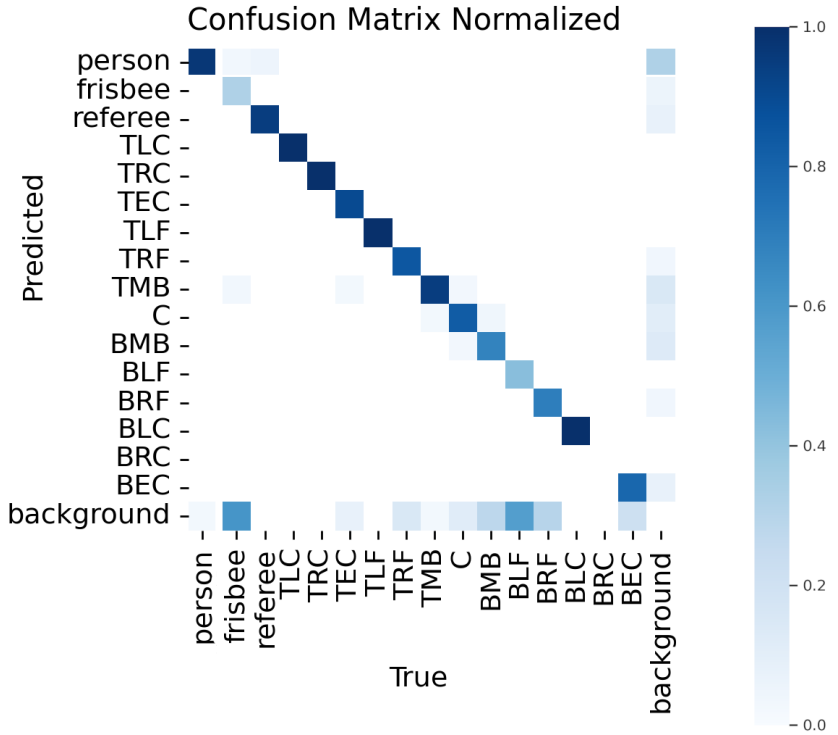
YOLOv8 object detector

Results

Confusion matrix (test data)



Confusion matrix (validation data)

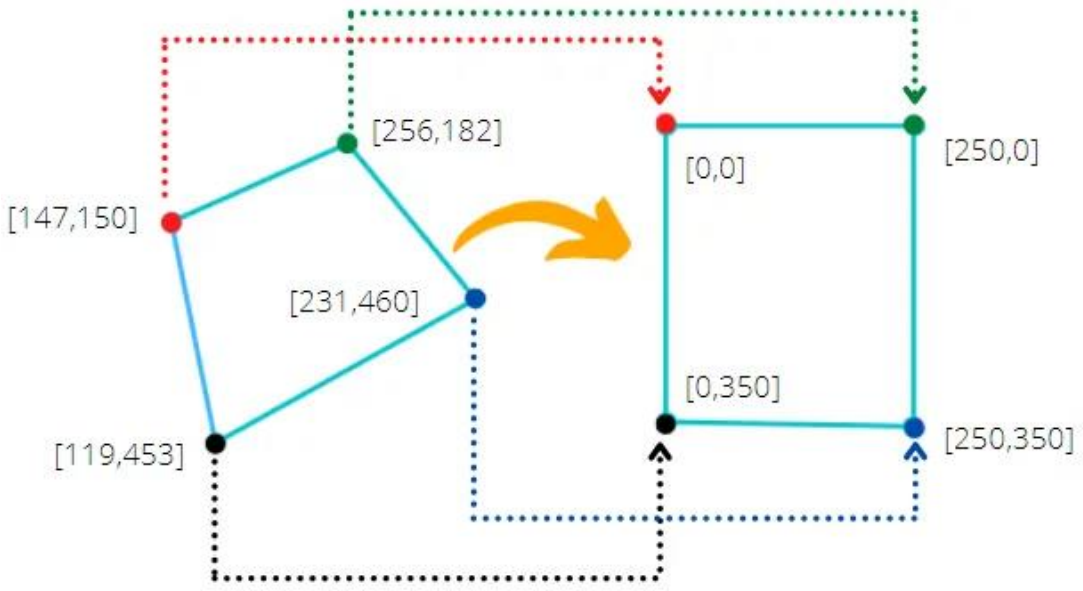


How to generate a bird's-eye view tactical map?

Perspective transformation

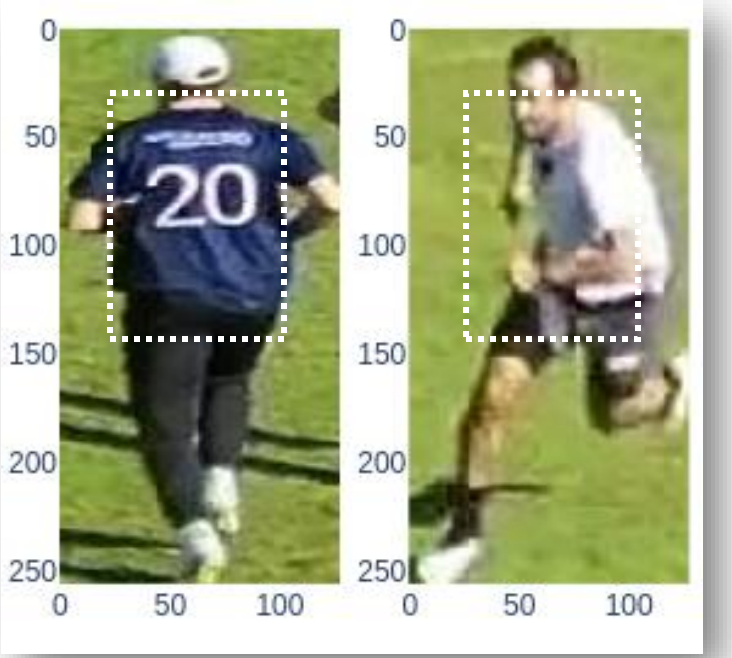
1. Select 4 best fitting landmarks
2. Get target coordinates for all selected landmarks
3. Calculate transformation matrix
4. Map all pixels on target space

Example



https://thinkinfi.medium.com/warp-perspective-and-transform-opencv-python-fbfd12560158

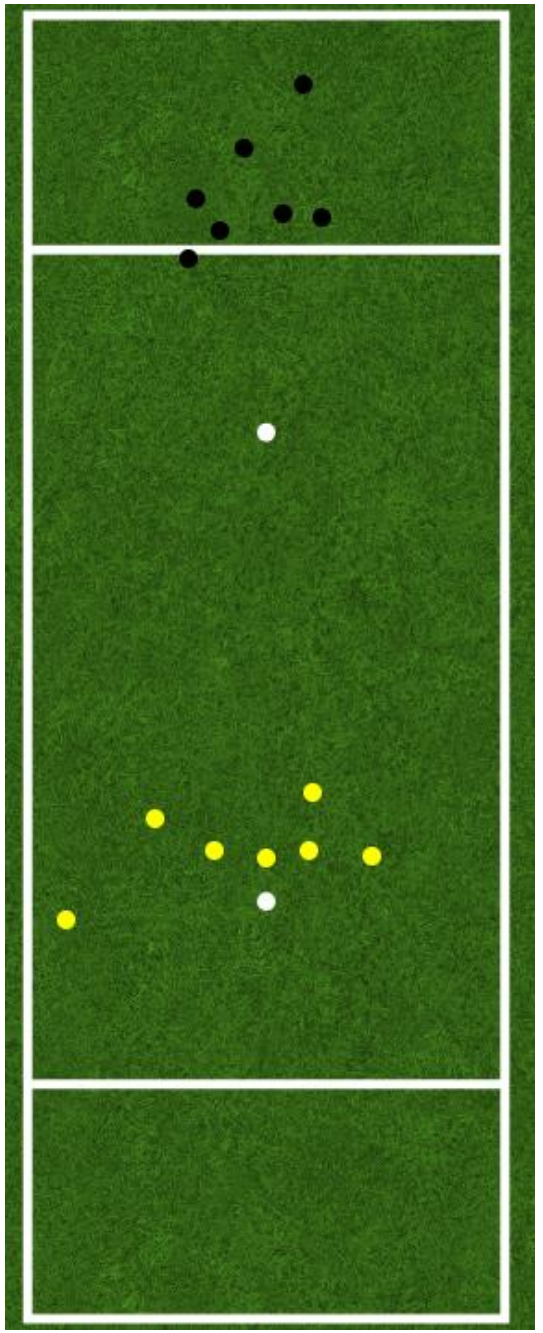
Team detection



dark team

bright team

1. Crop images
2. Reduce colors (Kmeans)
3. Cluster players based on most abundant color



Summary

https://github.com/marcwagn/ultimate_analytics

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