

Multi-Object Tracking For Strategic Sports Analysis

Data Science Capstone
Fall 2024

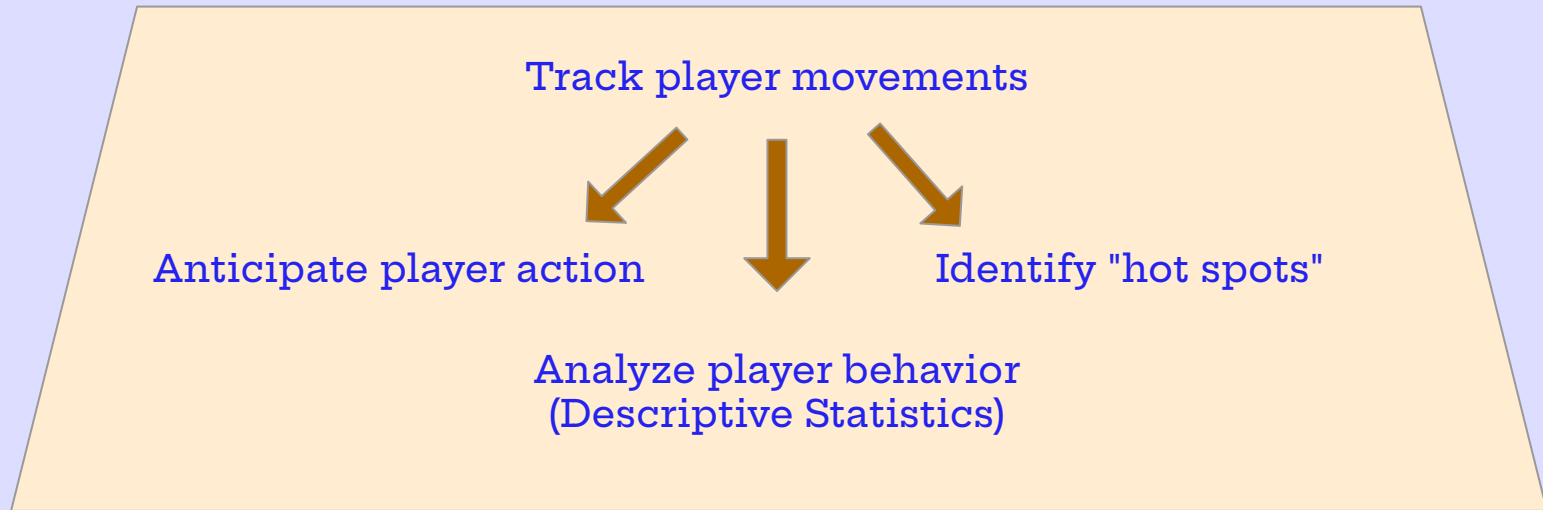
Caleb Musfeldt, Sreeram Kondapalli, Will Janes

01

The Background

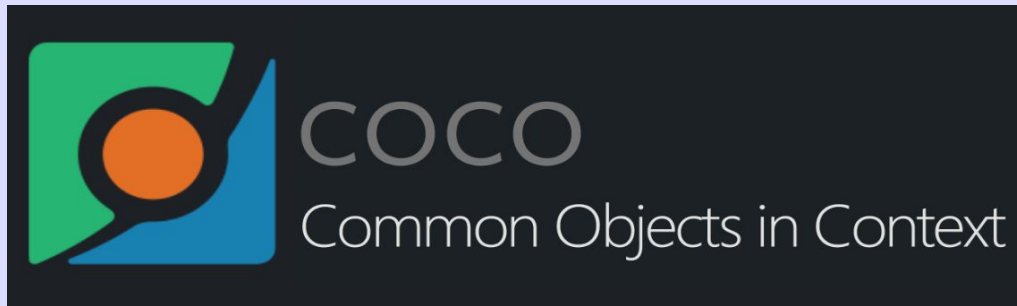
THE PROBLEM

Automate the analysis of sports film to help teams make informed strategic decisions



THE DATA

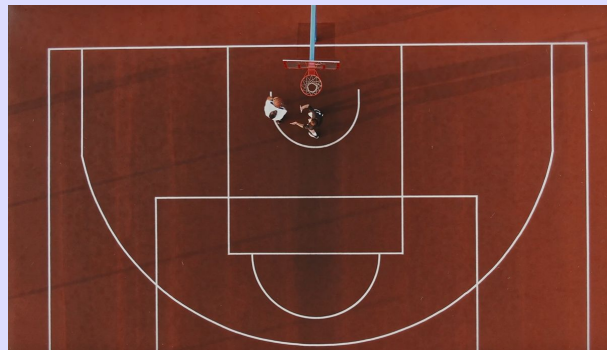
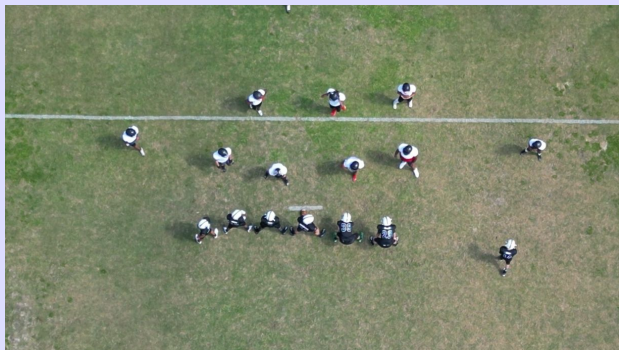
4



- Object segmentation
- 330K images (>200K labeled)
- 1.5 million object instances
- 80 object categories
- 5 captions per image

THE DATA

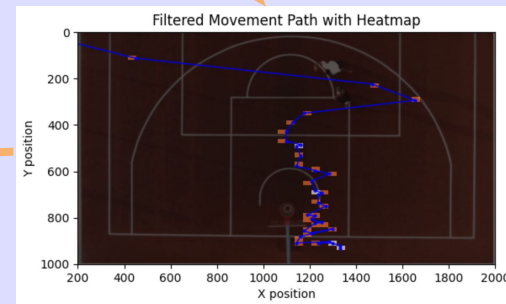
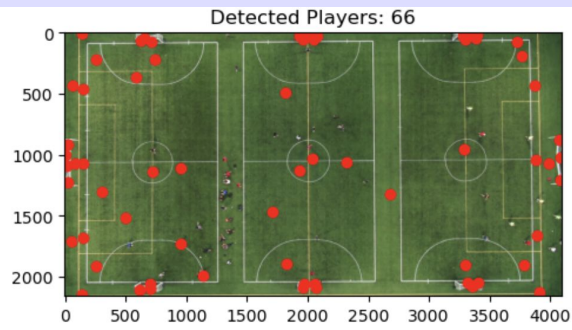
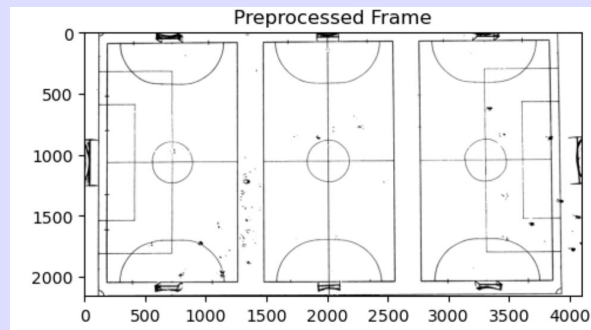
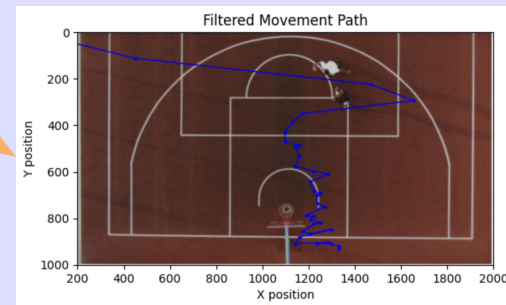
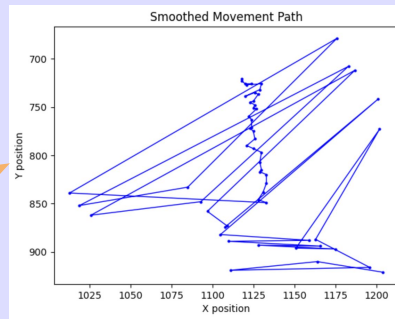
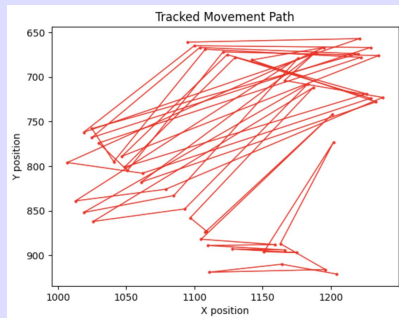
- Open source material (Pexels.com)
- Various sports (Basketball, Soccer and Football)
- Varying length and resolution
- Sometimes more than one game at a time



02

The Approach

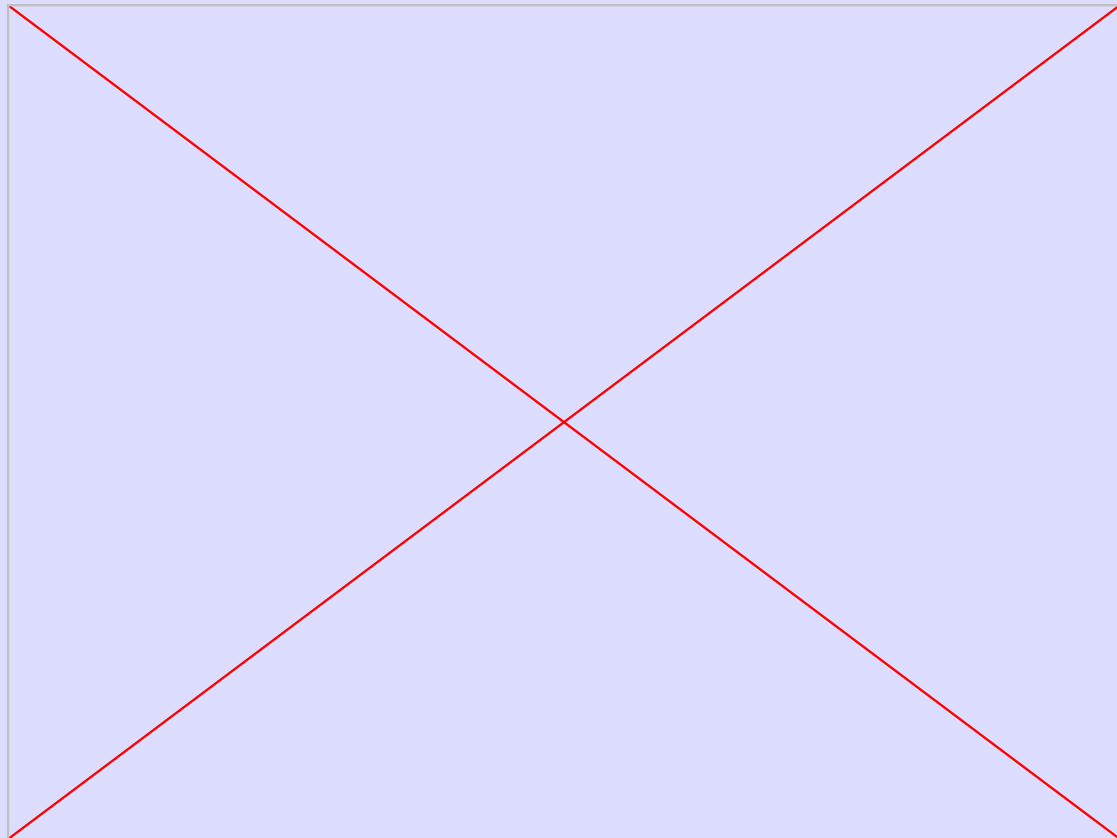
THE BUILD OUT



03

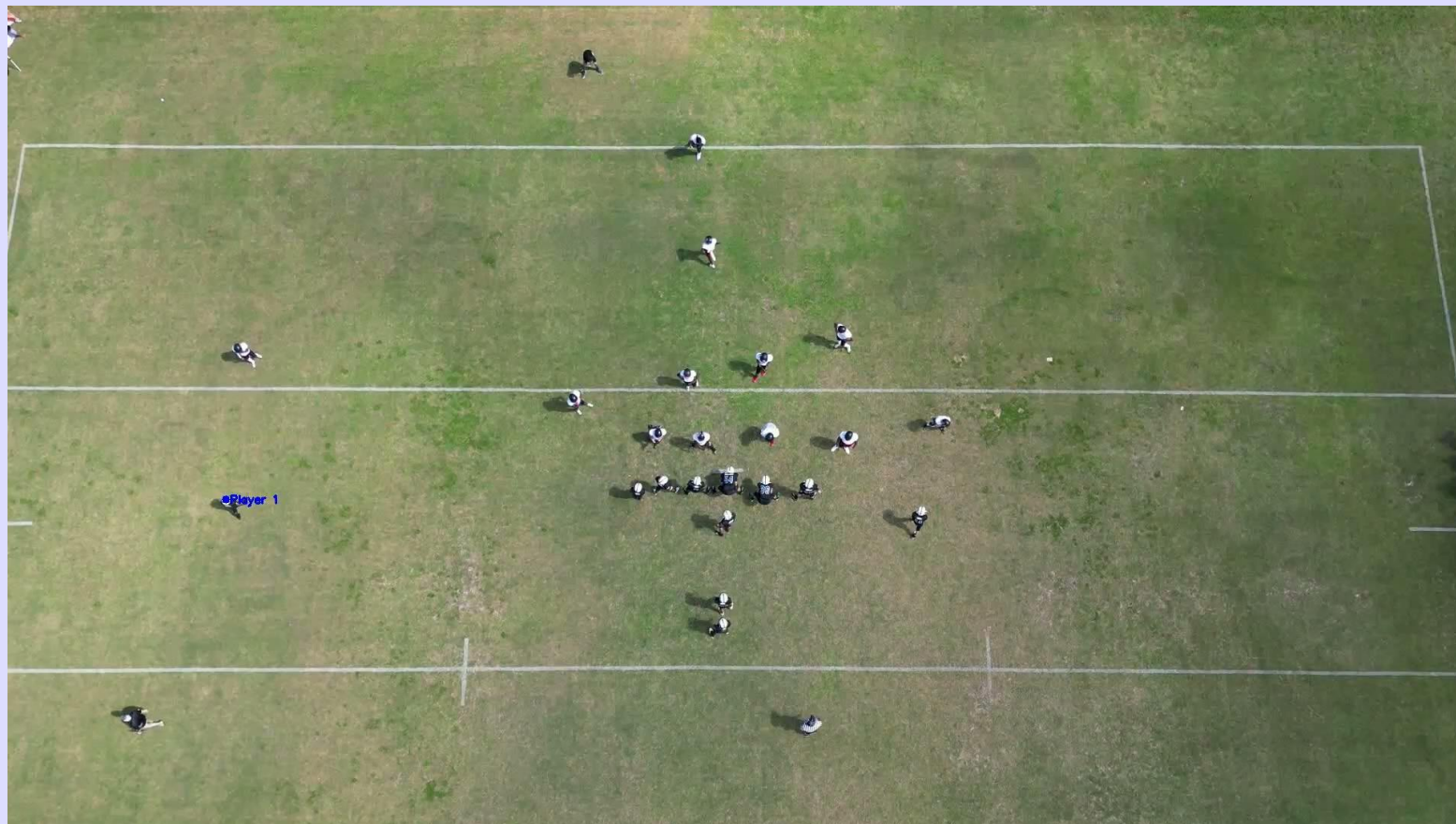
The Result

THE DEMO



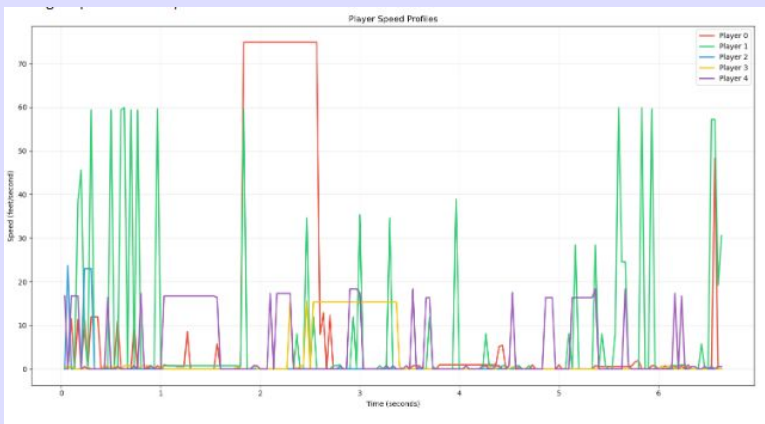
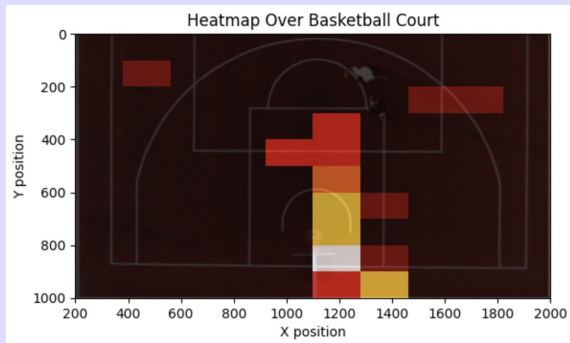
THE DEMO

10



THE FEATURES

Heat Maps



Descriptive Statistics

Player Statistics:

Player 0:
Total Distance: 65.6 feet
Average Speed: 6.7 mph

Player 1:
Total Distance: 42.6 feet
Average Speed: 4.4 mph

Player 2:
Total Distance: 3.1 feet
Average Speed: 0.3 mph

Player 3:
Total Distance: 15.1 feet
Average Speed: 1.5 mph

Player 4:
Total Distance: 29.4 feet
Average Speed: 3.0 mph

Total distance: 25.80007806844532
Average Speed: 4.300013011407553

04

The Conclusion

THE ETHICS

13

Player/Data Privacy
(Legal and moral implications)



Unfair advantage
(Only certain teams have access)



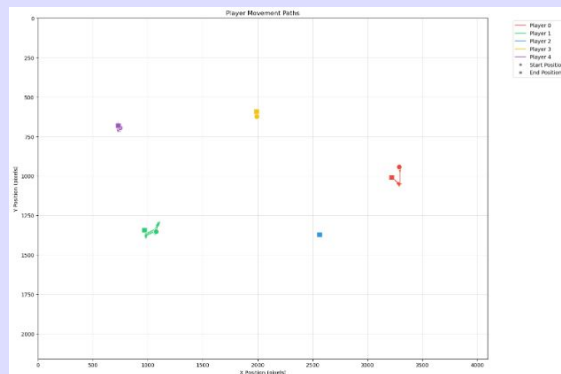
THE CHALLENGES

Pixel Normalization

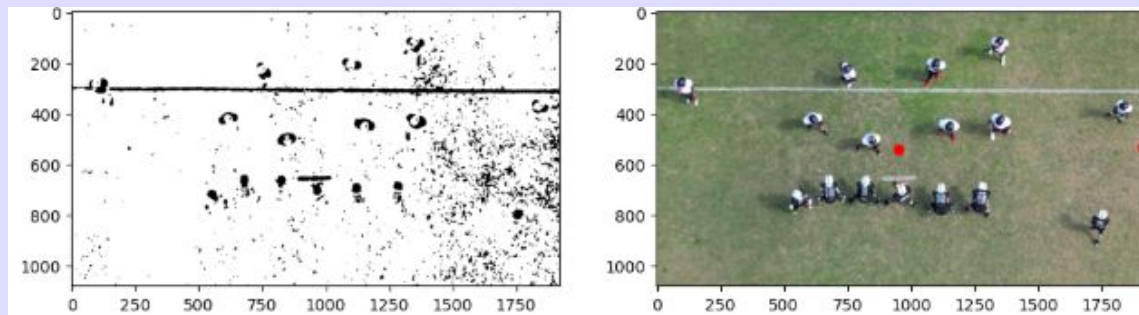
Tracking Summary:

Player 0: tracked for 103 frames, total distance: 414.3 pixels
 Player 1: tracked for 164 frames, total distance: 1909.3 pixels
 Player 2: tracked for 6 frames, total distance: 42.5 pixels
 Player 3: tracked for 13 frames, total distance: 91.4 pixels
 Player 4: tracked for 170 frames, total distance: 680.5 pixels

Tracking All Players



Difficulty with Inconsistent Field Colors



THE NEXT STEPS

Accurate Player Identification




Player Path Prediction



Simple GUI for consumer use

Upload your File :


Drag & Drop
or [browse](#)
Supports: JPEG, JPG, PNG

THANK YOU

Photo Cred

<https://www.google.com/url?sa=i&url=https%3A%2F%2Fnewsroom.ucla.edu%2Fstories%2Fdoctors-patients-at-the-crossroads-make-difficult-decisions-together&psig=AOvVaw0ttQ2Pjmcst6OqIt5w0em6&ust=1733191023502000&source=images&cd=vfe&opi=89978449&ved=0CBcQjhxqFwoTCMjowu79h4oDFQAAAAAdAAAAABAE>

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