

# COMPUTER VISION-DRIVEN ULTIMATE FRISBEE TRACKING AND ANALYTICS

Caroline McKee

Hitha Revalla

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***Motivation:** The development of automated sports analytics software is an increasingly relevant computer vision application. We believe it may be possible to implement an automated frisbee/player tracker for use in analyzing ultimate frisbee game footage, and in this project, we explore different approaches for doing so. This tracker may be of use in both technical training (reducing throwing errors, analyzing habits) and tactical training (analyzing opposing team and creating specific strategies).*

# Goal and Methodology

**Goal:** To implement a pipeline to process high-definition ultimate frisbee footage in order to track the locations of both the frisbee and players, with the ultimate goal of automatically computing the number of passes which occur.

## (1) MATLAB Image Processing

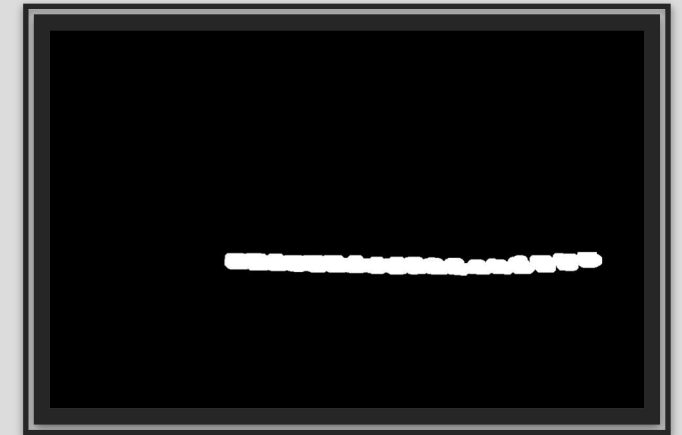
- Background subtraction for object tracking, possibly involving adaptive thresholding to correct for shadows, small region removal, etc.
- Template matching, edge detection, and color-based (MAP) recognition to track frisbee and players (try several approaches to see what is most effective)
- Foreground motion deblurring
- Region labeling to determine when passes are completed

## (2) Python OpenCV Analysis

- CRST Tracker testing
- KCF Tracker testing
- MOSSE Tracker testing

# Dataset and Initial Results

- **Stage 1 Dataset:** Footage of either two or three people throwing (both stationary and while in motion)
- **Stage 2 Dataset:** USAUltimate game footage (exact game to be determined)



- Using a combination of thresholding and morphological image processing, we were able to track the flight of the frisbee during a video of a simple pass from one player to the other
- However, the pipeline required manual tuning in a couple of places; in the future we would like to make this more automated, and also automatically determine when the pass is thrown and caught