Detection and Re-Identification in the case of Horse Racing

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TLDR

- Object detection and re-identification for horse racing jockeys
- Decision to focus on jockey's helmets due to distinctiveness and robustness to rotation
- Trained across classes from one camera angle and then applied to all angles
- Basic helmets designs and camera angles where racers were close to camera were best

Process

Conversion: Mp4 to JPG conversion using FFMPEG
Object Detection: Detection of jockey helmets used Grounded-SAM
Dataset Creation: One camera angle used for semi-automated dataset creation
Re-Identification: A trained ResNet-18 model used for Re-Identification
Annotation: After a confidence threshold, the frames are annotated with bounding boxes
Conversion: JPG to Mp4 conversion using FFMPEGv

Results

	Cam 1 (Training Cam)	Cam 2	Cam 3	Cam 4	Cam 5	Cam 6
Class 1	94.4	77.5	59.4	73.6	82.6	61.7
Class 2	79.2	77.9	76.8	86.4	77.2	77.1
Class 3	89.6	43.2	55.0	22.4	23.6	53.1
Class 4	95.2	70.7	21.7	66.4	69.2	64.5
Class 5	69.6	51.4	39.1	1.6	16.5	53.1

Dataset

Jockey Helmets: We created a dataset of 5 jockey helmets for the most distinctive racers from one camera angle
Colour Automation: Using colour detection, the dataset was semi-automated with manual dataset noise correction afterwards
Range: The dataset size ranged from 80 to 160 images per class
Future Issues: An issue identified is some racers can have very similar helmets which could cause issues expanding the dataset

Mutli-Camera: Due to the helmets not being affected heavily by rotation, we had good overall results on cameras we had not trained on
Errors: The least successful classes were those that had more intricate designs and were affected by rotation more

Workflow