

UFC Computer Vision

Outline

1. Exploration of Detectron2 framework
2. Player Identification
3. Deployment in GCP
4. Future Work

Detectron2 Framework

Detectron is Facebook AI Research's (FAIR) software system that implements state-of-the-art object detection algorithms.

Many object related algorithms *are* embedded in *Detectron* including Mask R-CNN, Fast R-CNN, Faster R-CNN, RetinaNet.

We used:

For **Pose Estimation** KeyPoint R-CNN

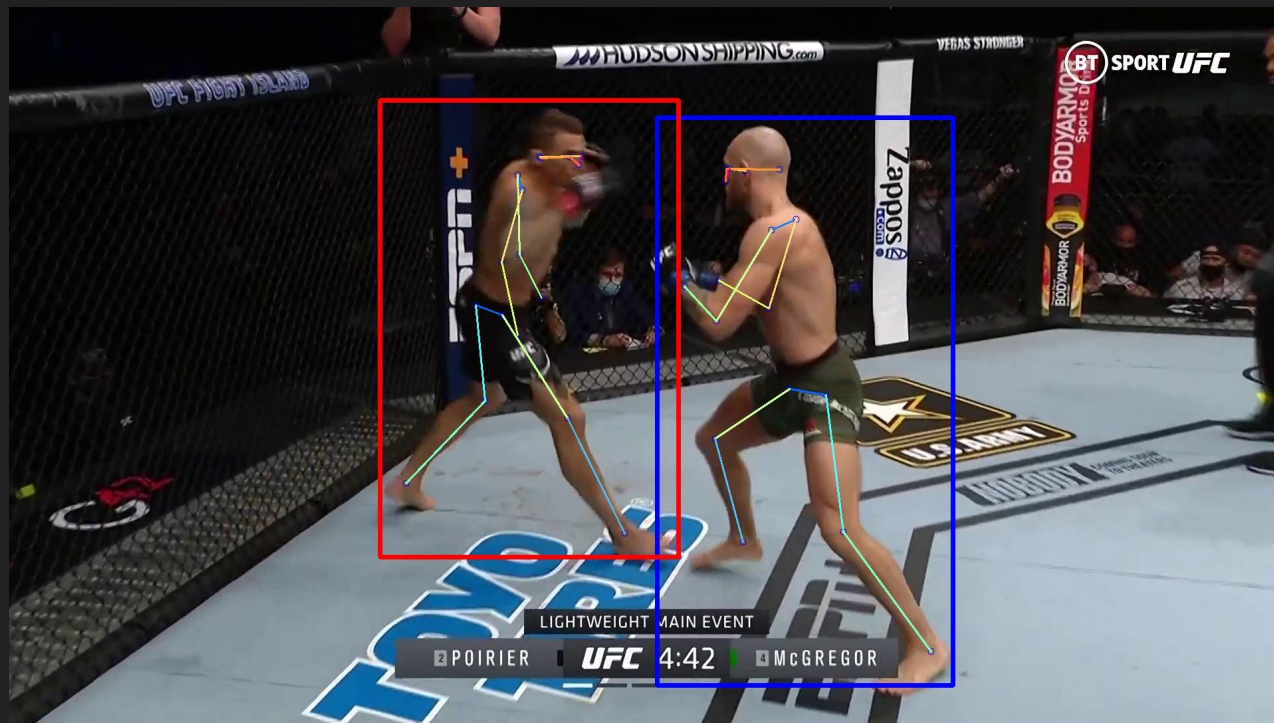
For **Object Detection** Fast-RCNN

For **Semantic Image Segmentation** Feature Pyramid Network

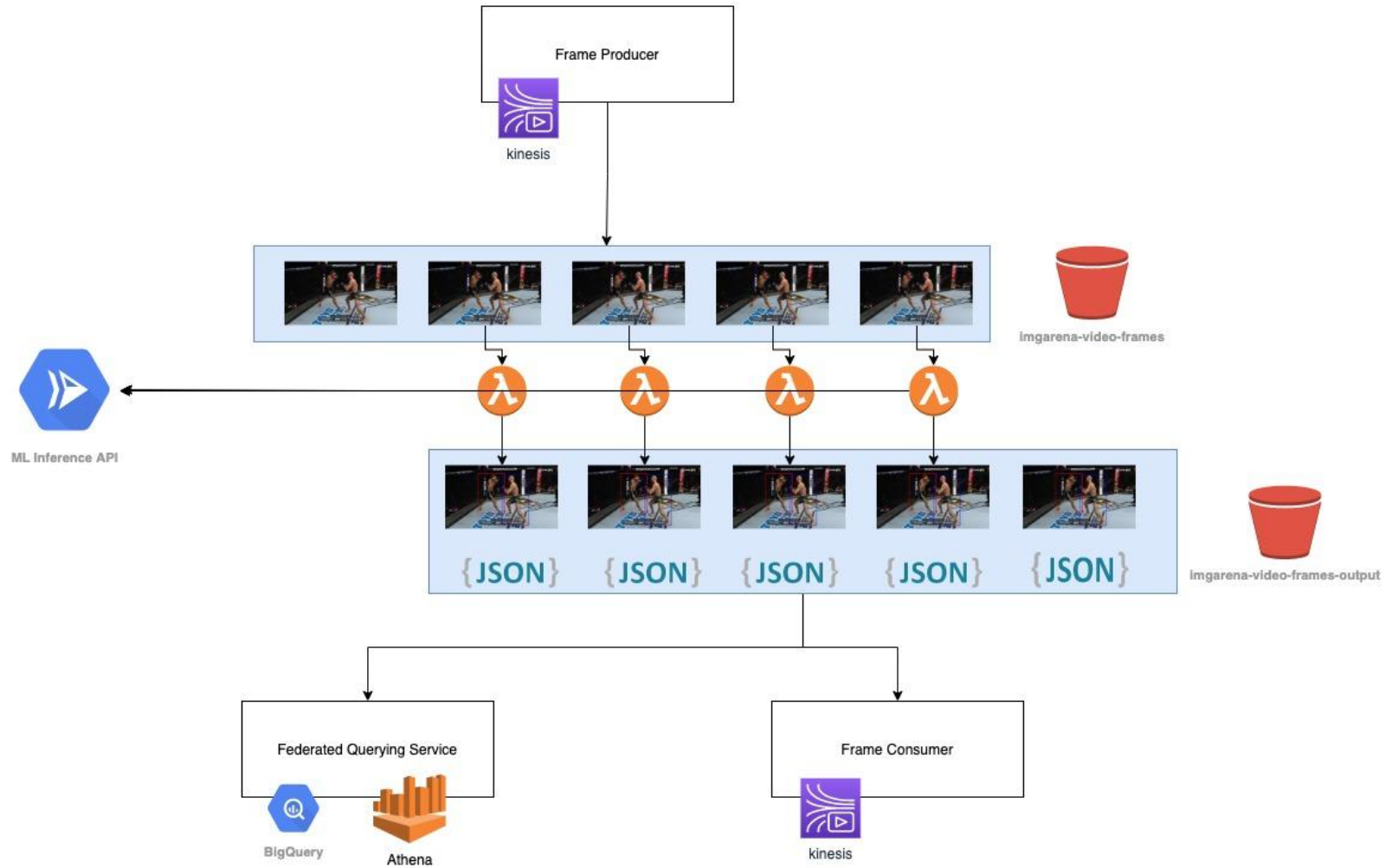
Panoptic FPN



Keypoint R-CNN



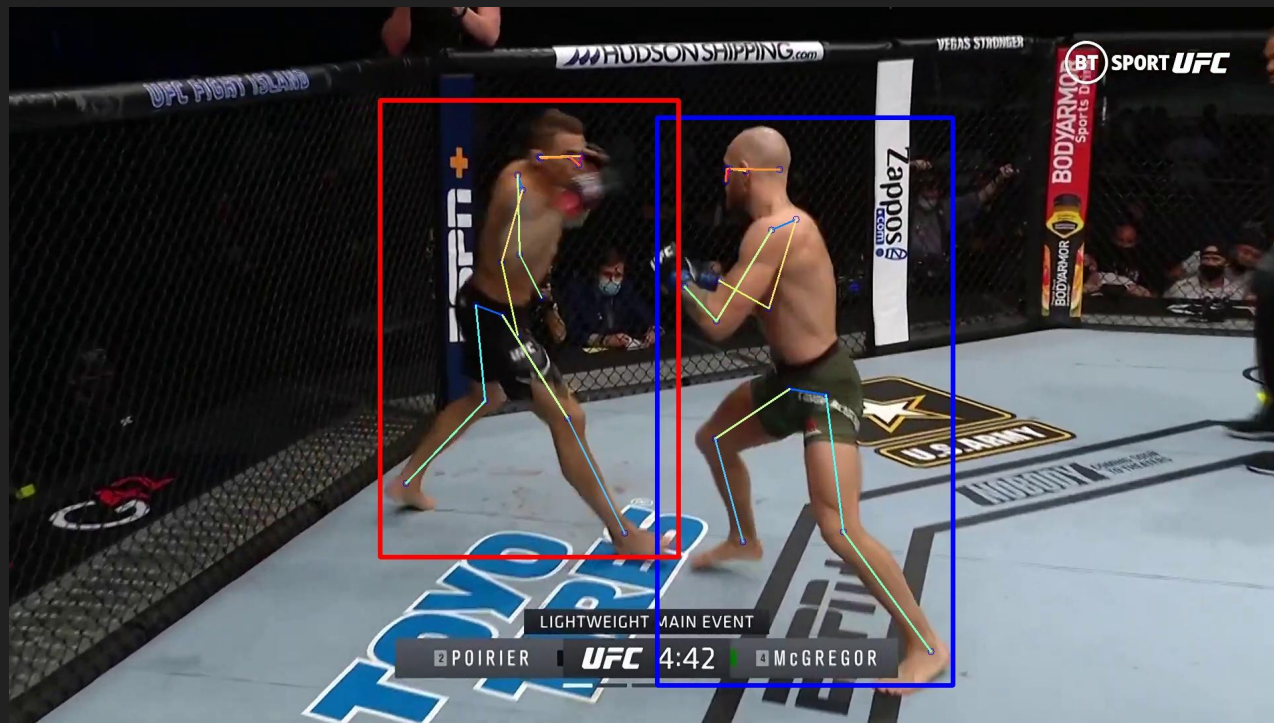




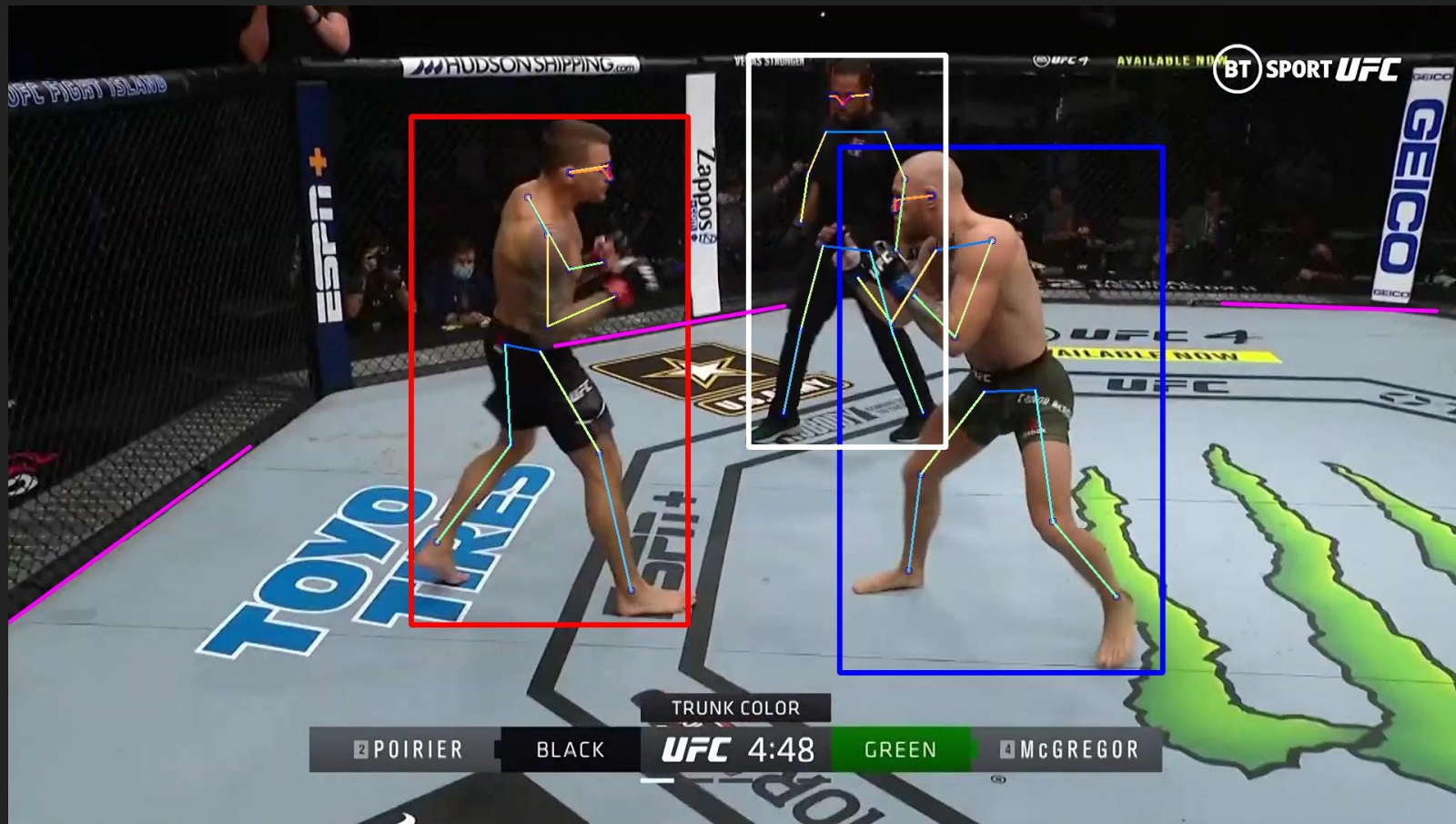
Possible Features

- Head height from ground over time
- Angle about elbow keypoint to monitor guard and punch
- Movement analysis
- Fatigue analysis
- Usage of Octagon
- Target area relative to opponent
- Action detection
- Future Predictions with LSTMs
- Apply to any Sport (tennis, basketball, volleyball)

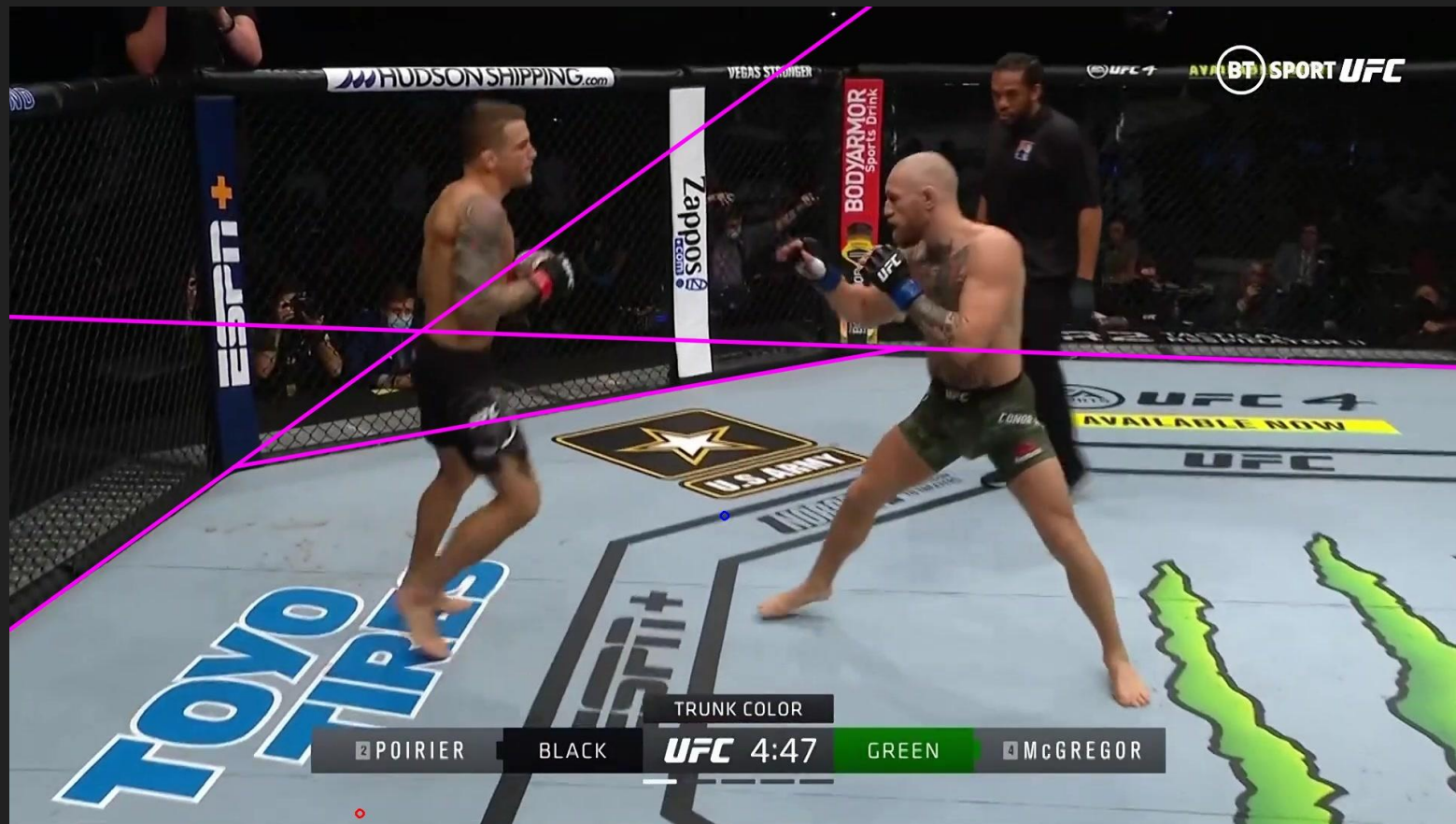
Keypoint R-CNN



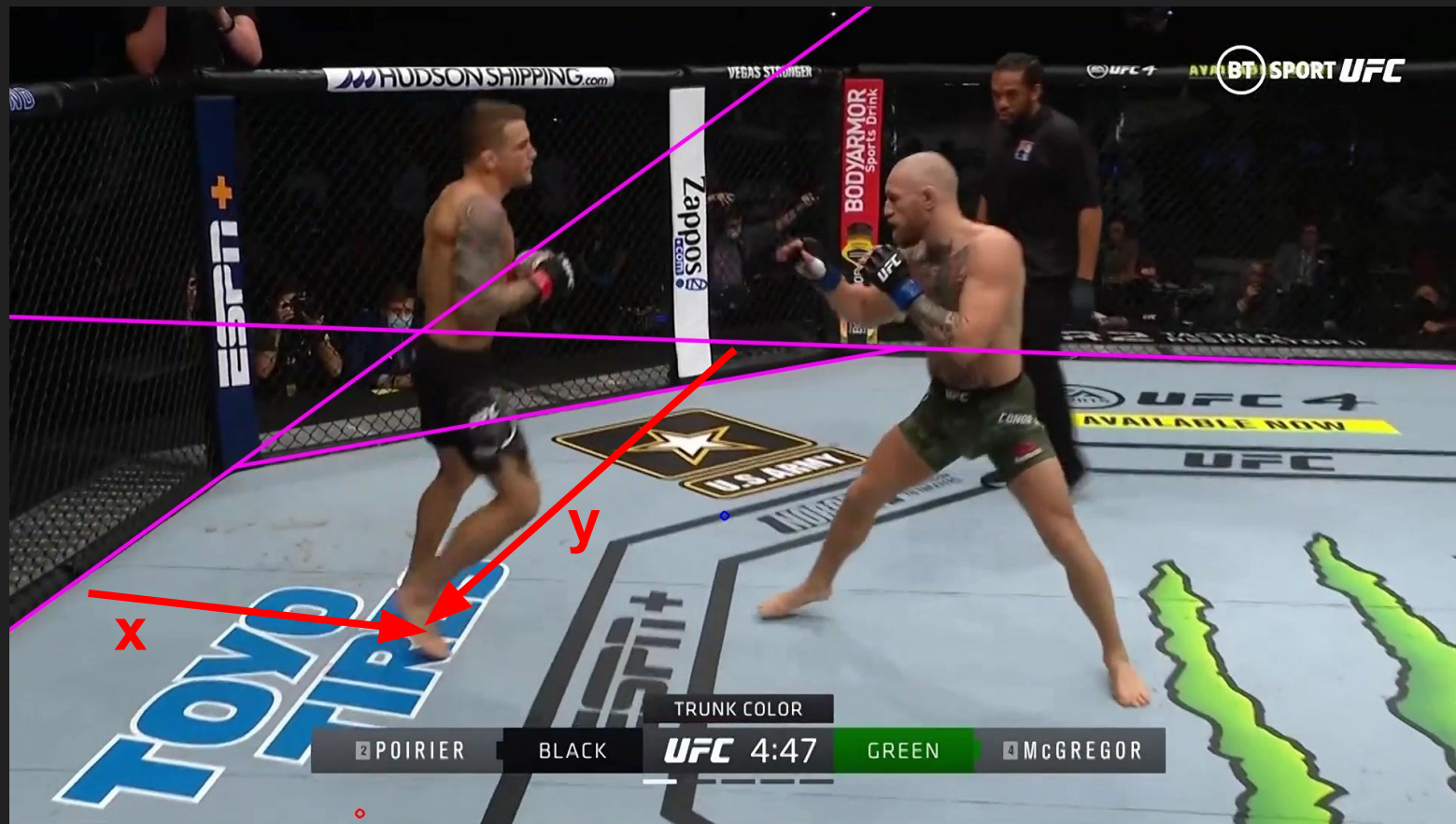
Approx Localization



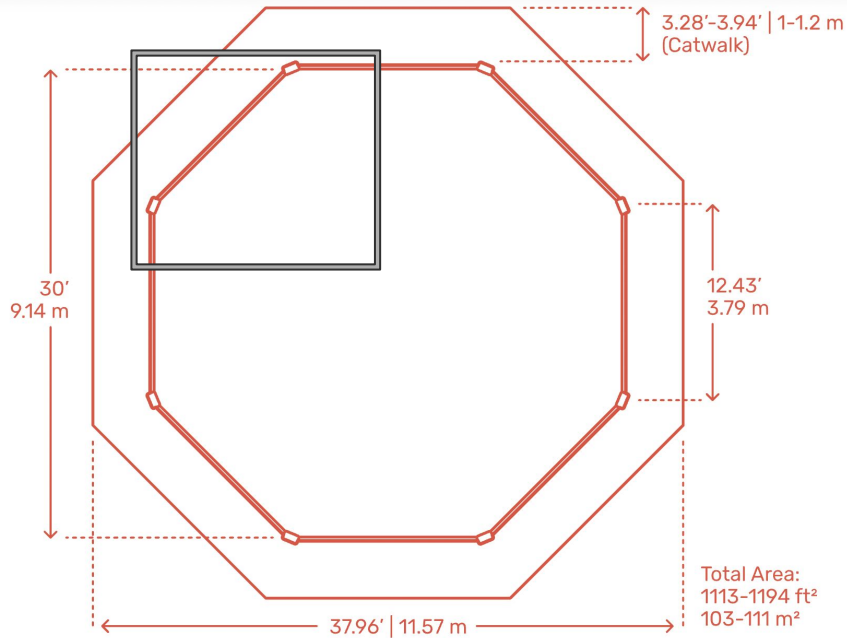
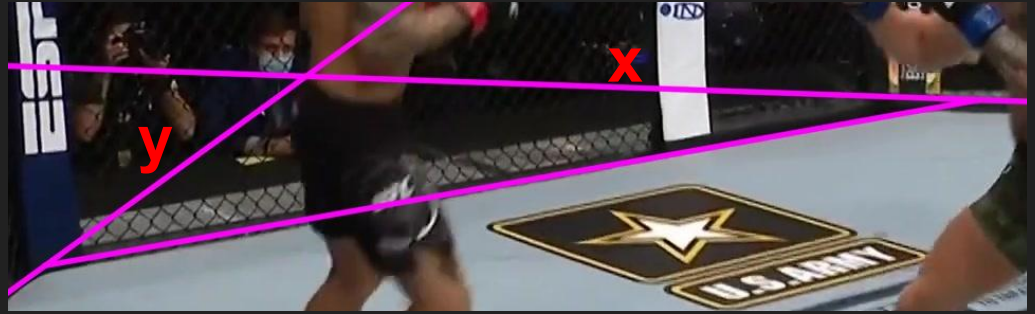
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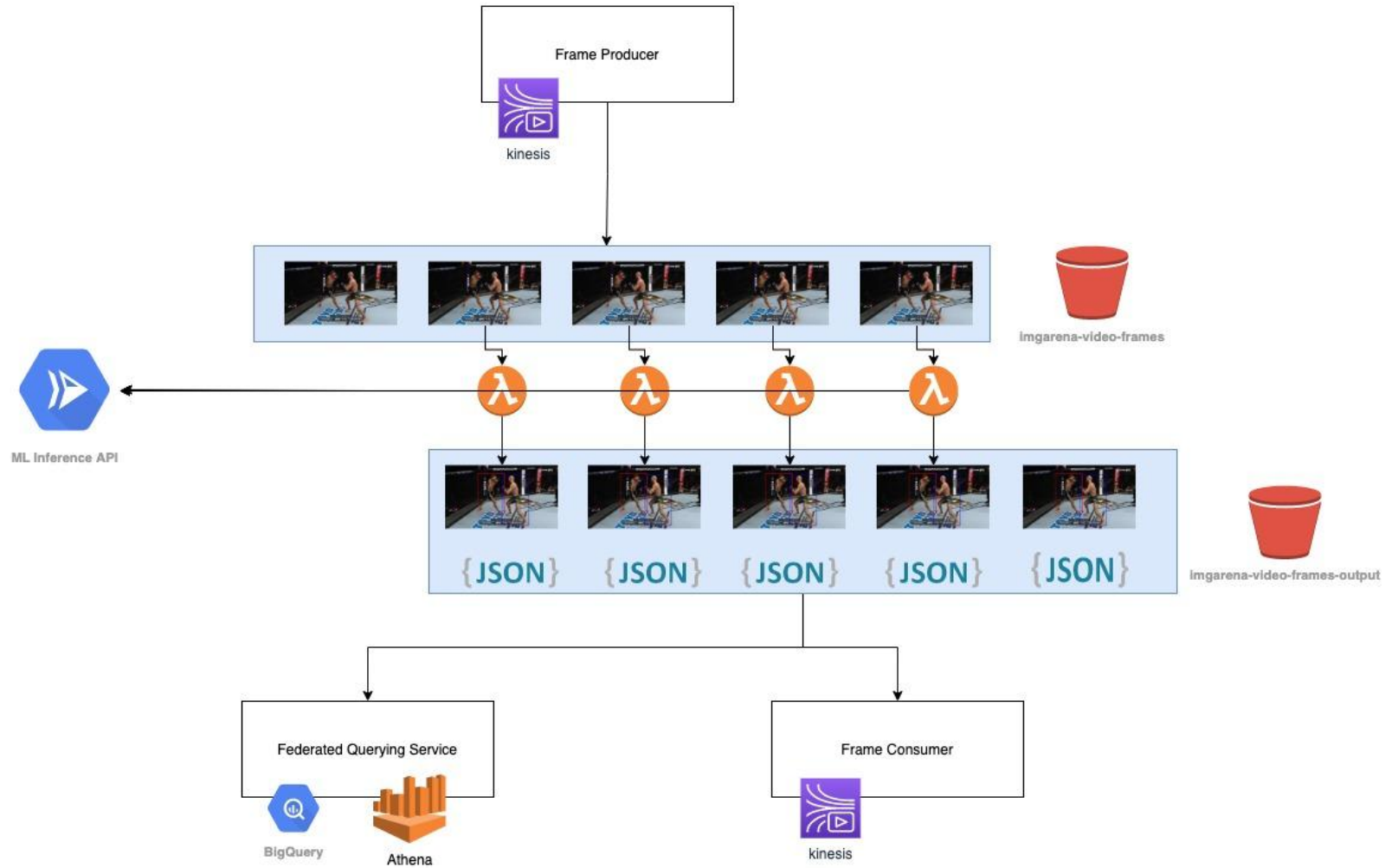


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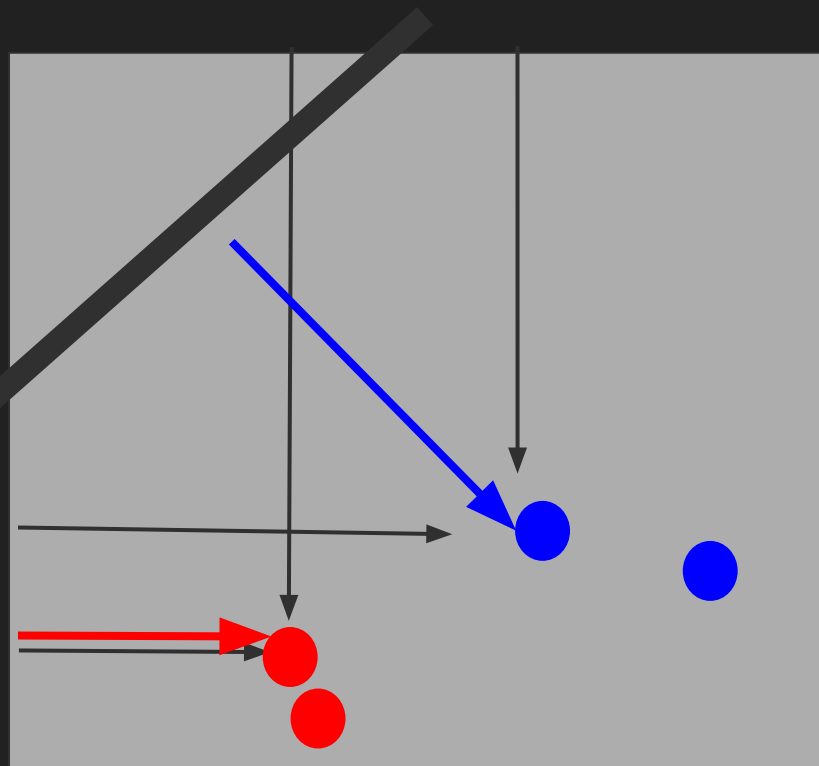
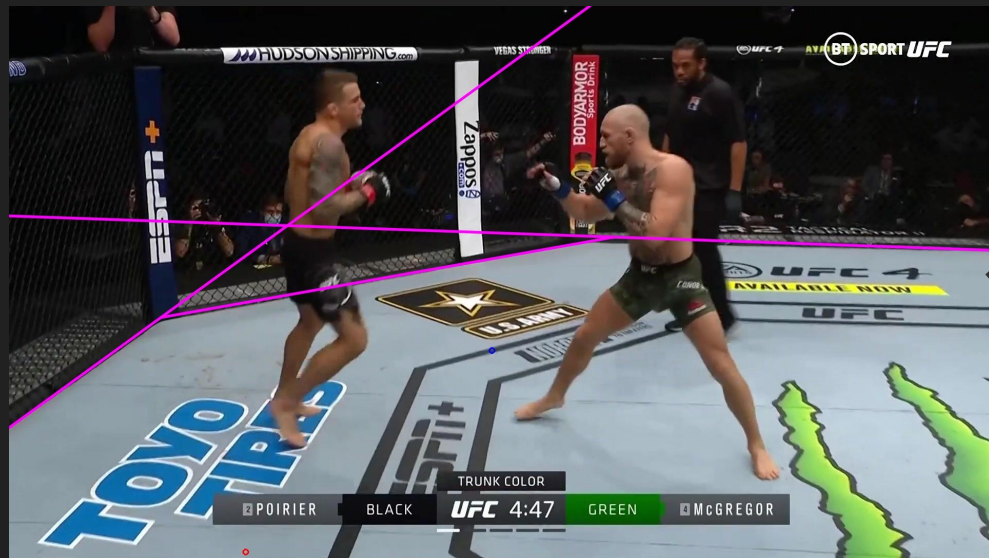


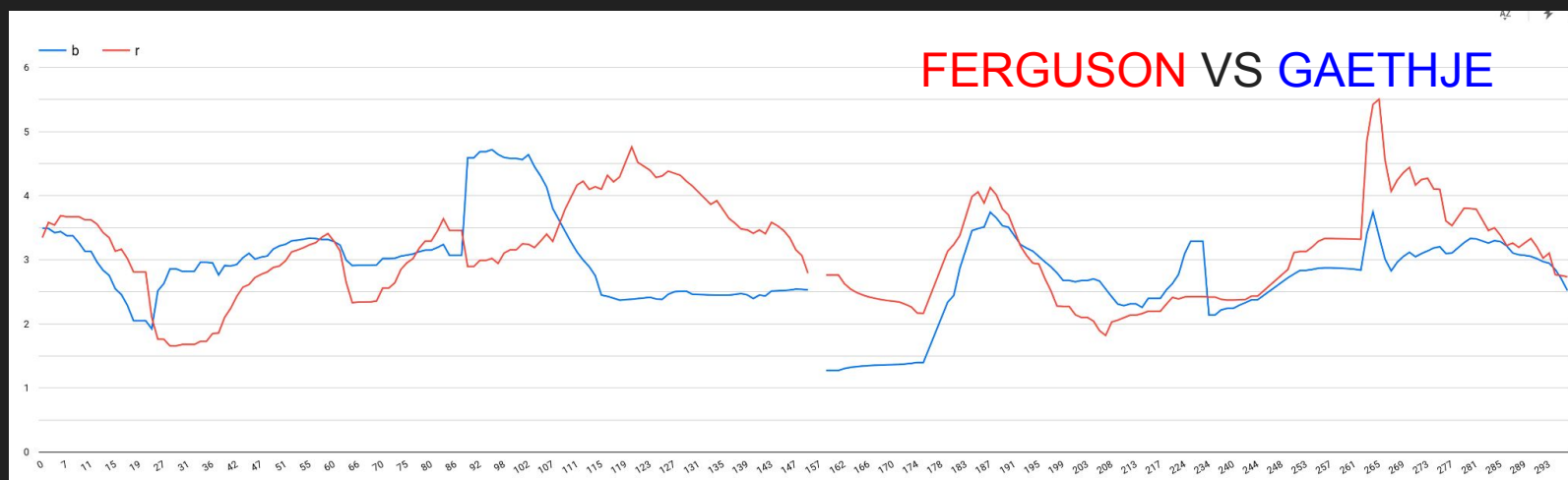
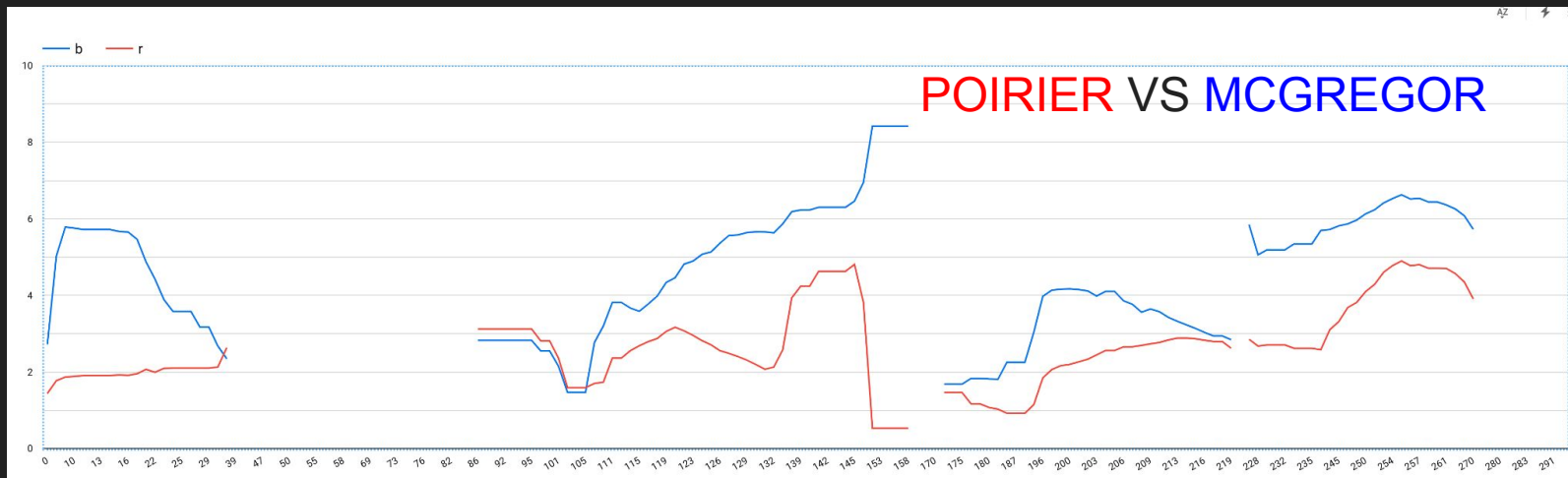
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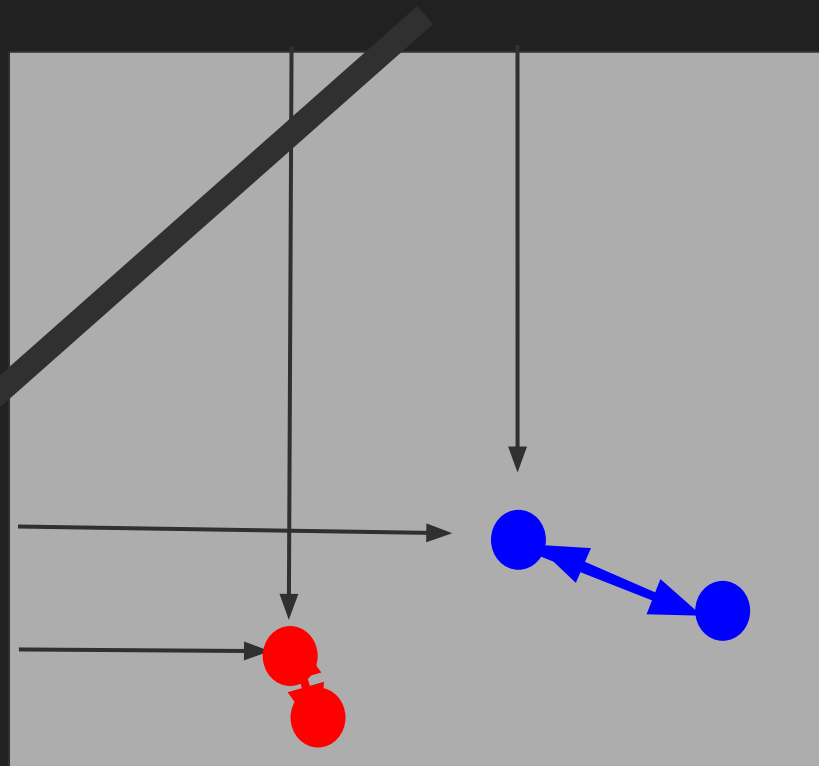
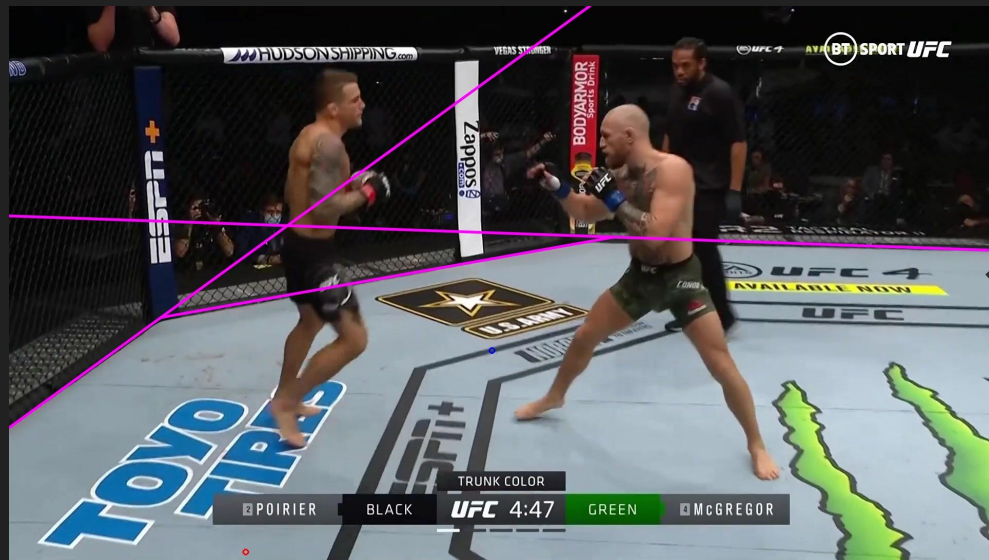


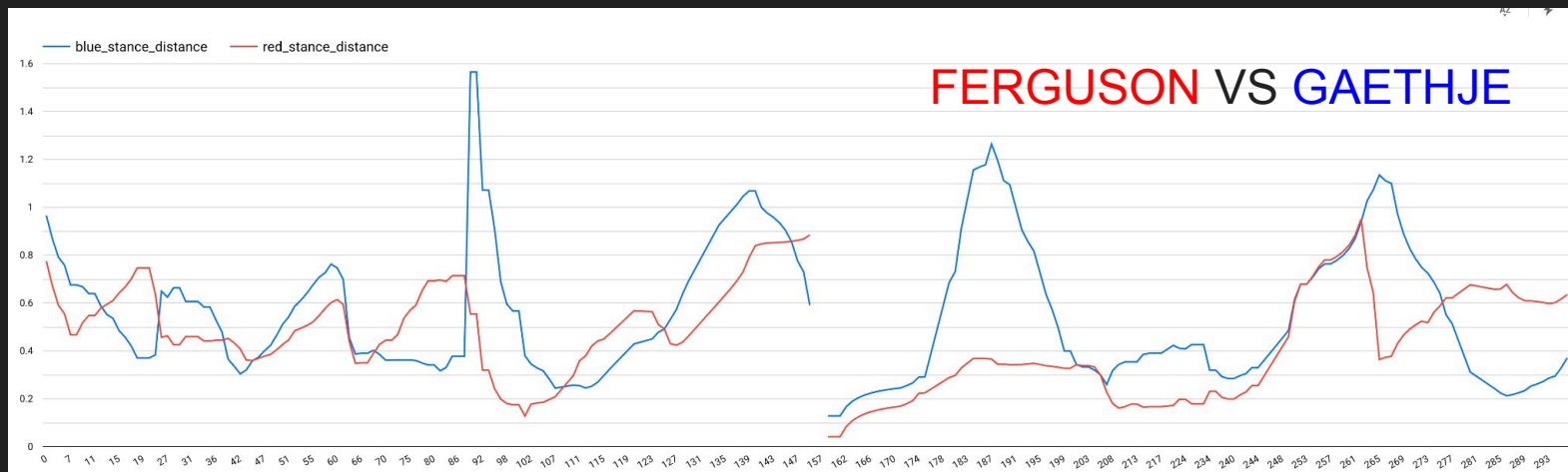
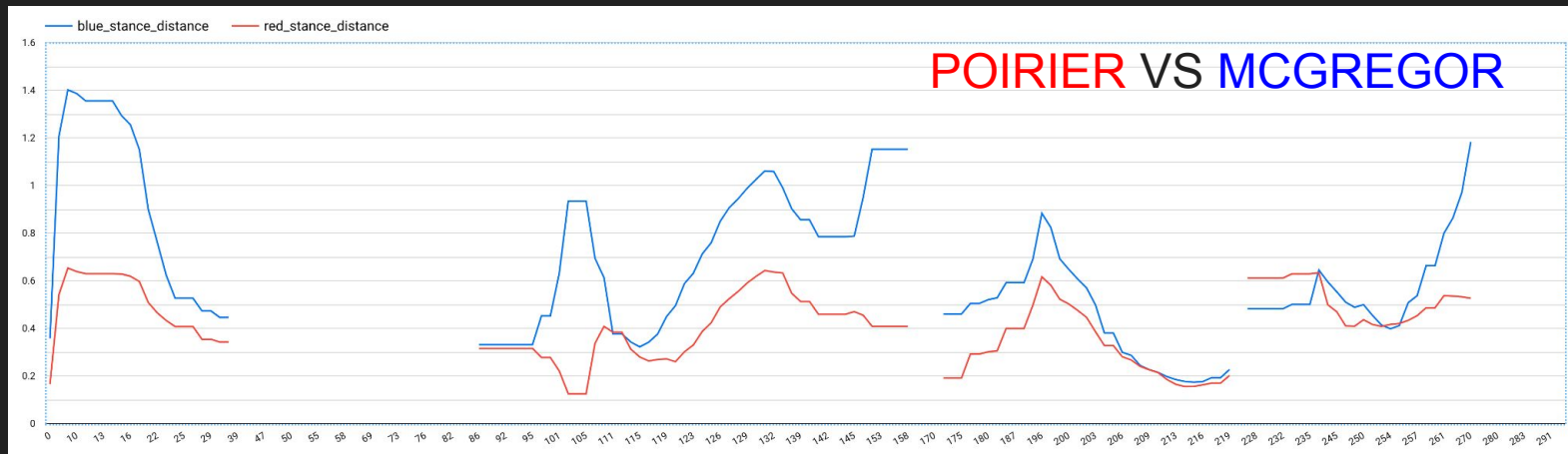
Distance from Closest Fence



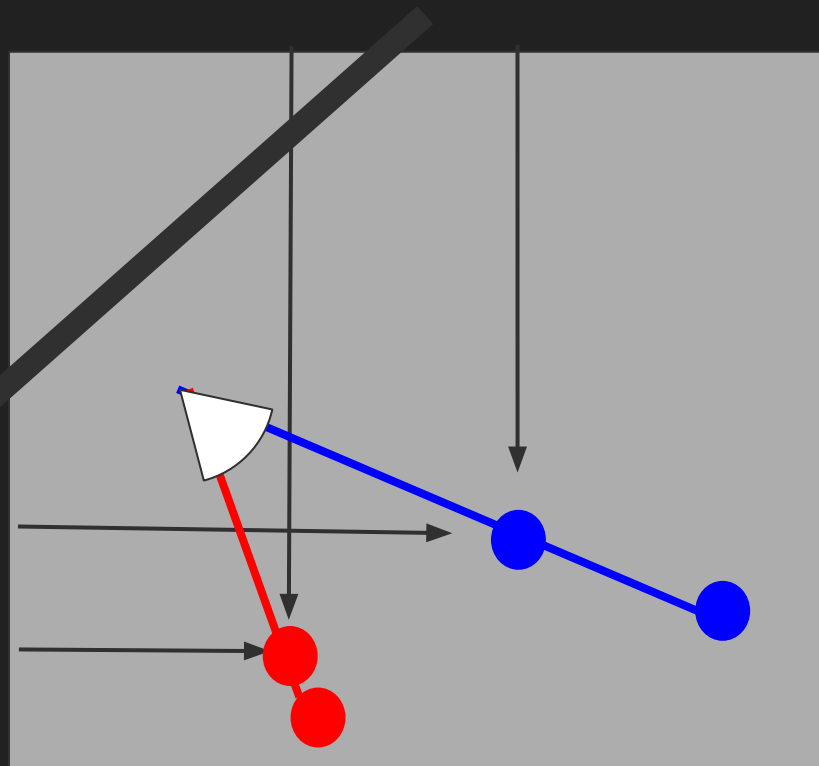
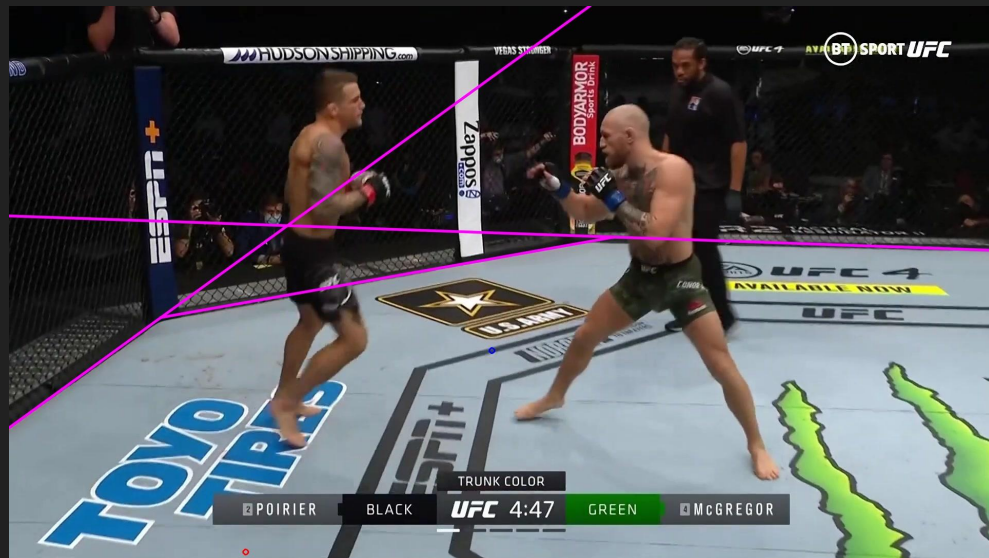


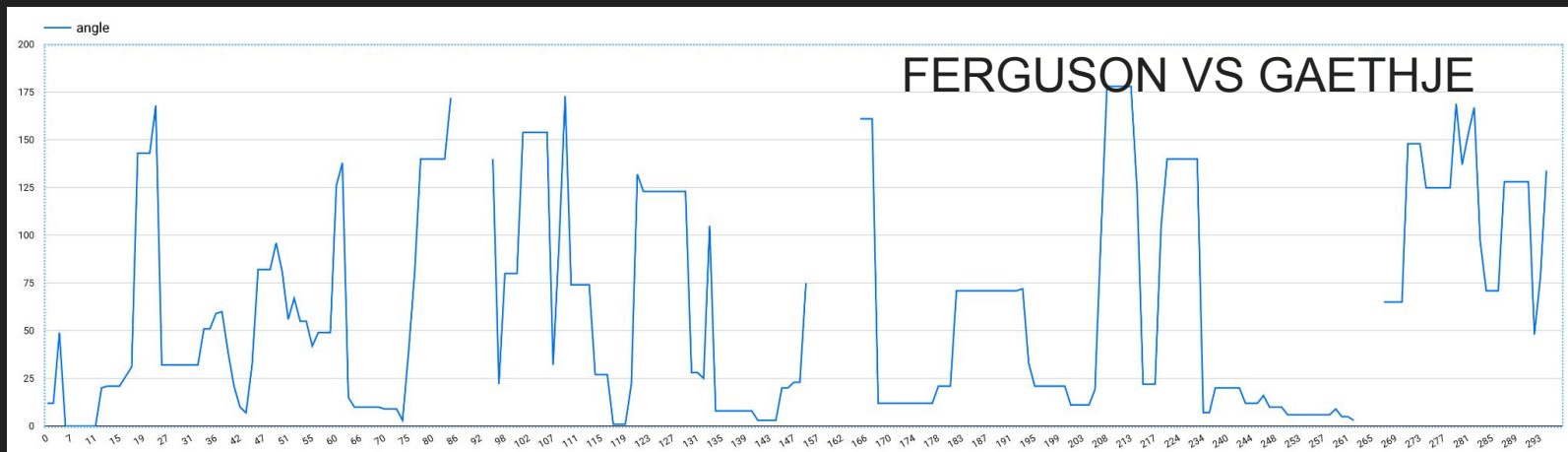
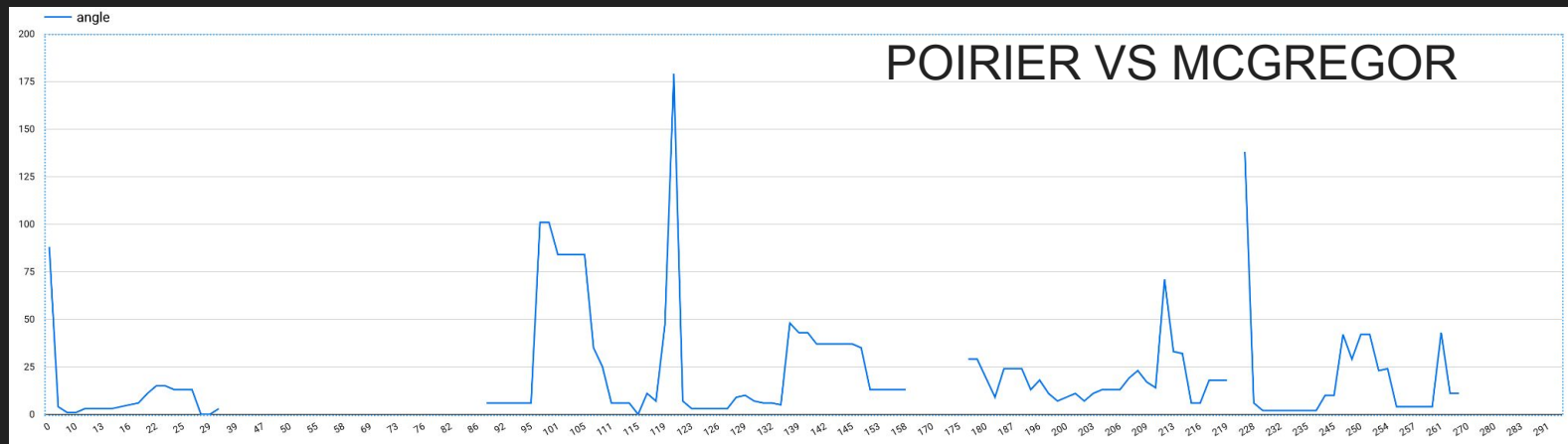
Stance Size





Relative Stance Angle





With more time

- Run more videos, more rounds and more fights
- Aggregate the metrics across rounds to see if there are any correlations with the judges scores