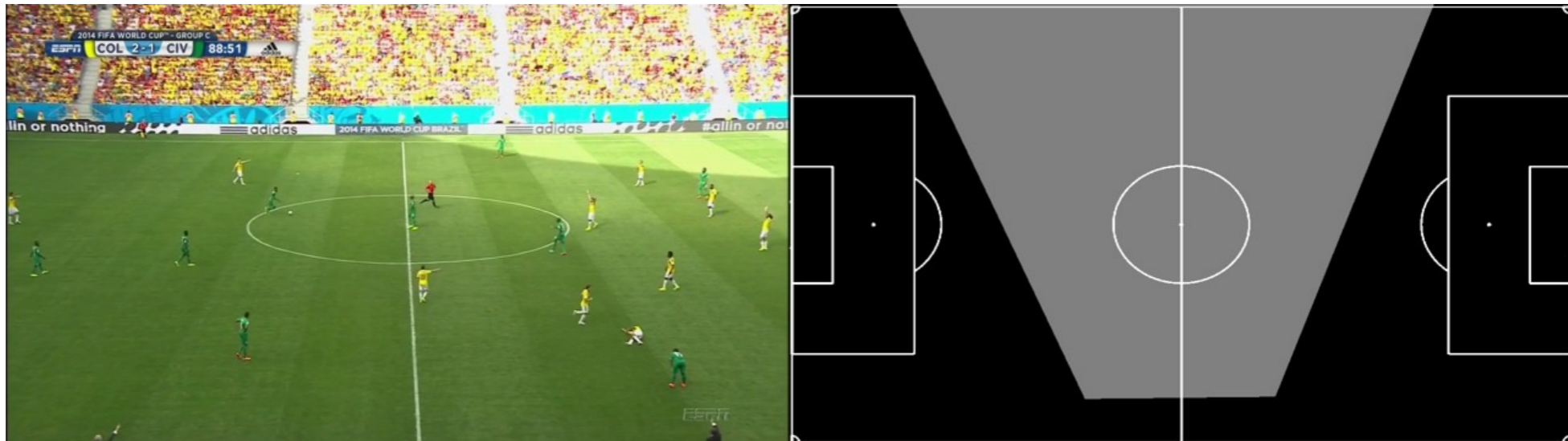


Automated Top View Registration of Broadcast Football Video

Rahul Anand Sharma, Bharath Bhat, Vineet Gandhi & C.V.
Jawahar
CVIT, IIT Hyderabad, India

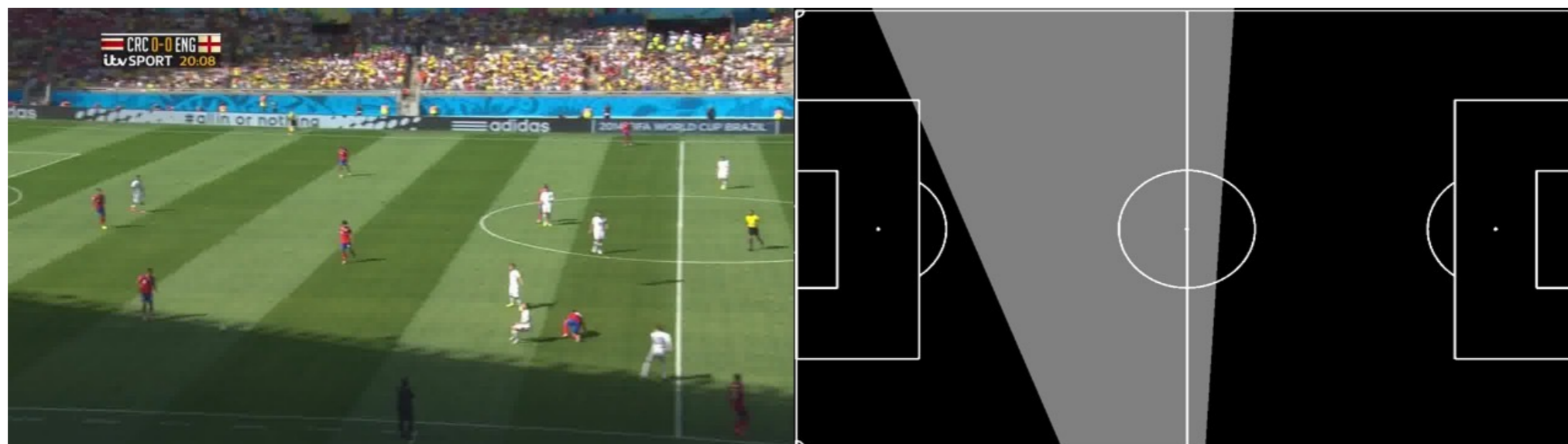
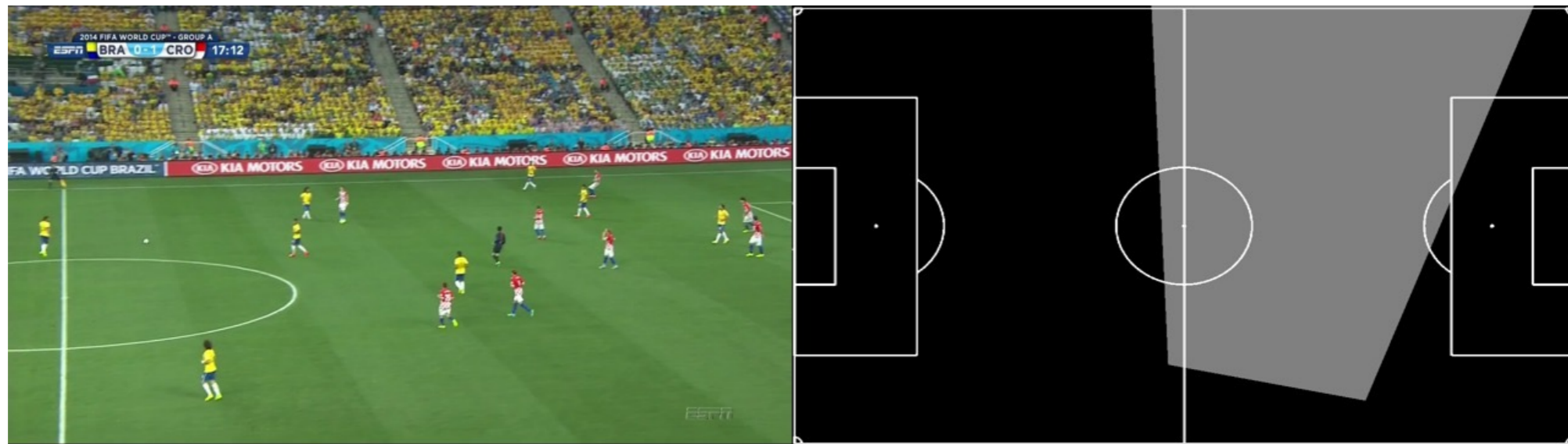
Problem Statement

- Calculate the projective transformation from field image to top view image.
- Required to register player locations on a global coordinate system.



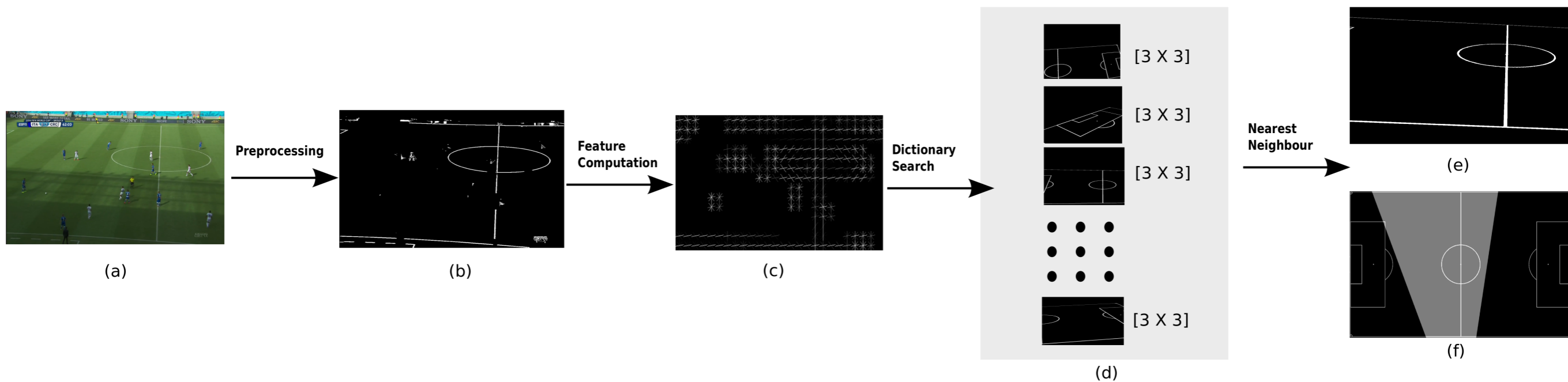
Challenges

- Viewpoint may not have enough “good” correspondences.
- Lighting changes
- Previous approaches (Little et al.) required the first frame of a sequence to be manually initialized, the goal is to make it fully automatic



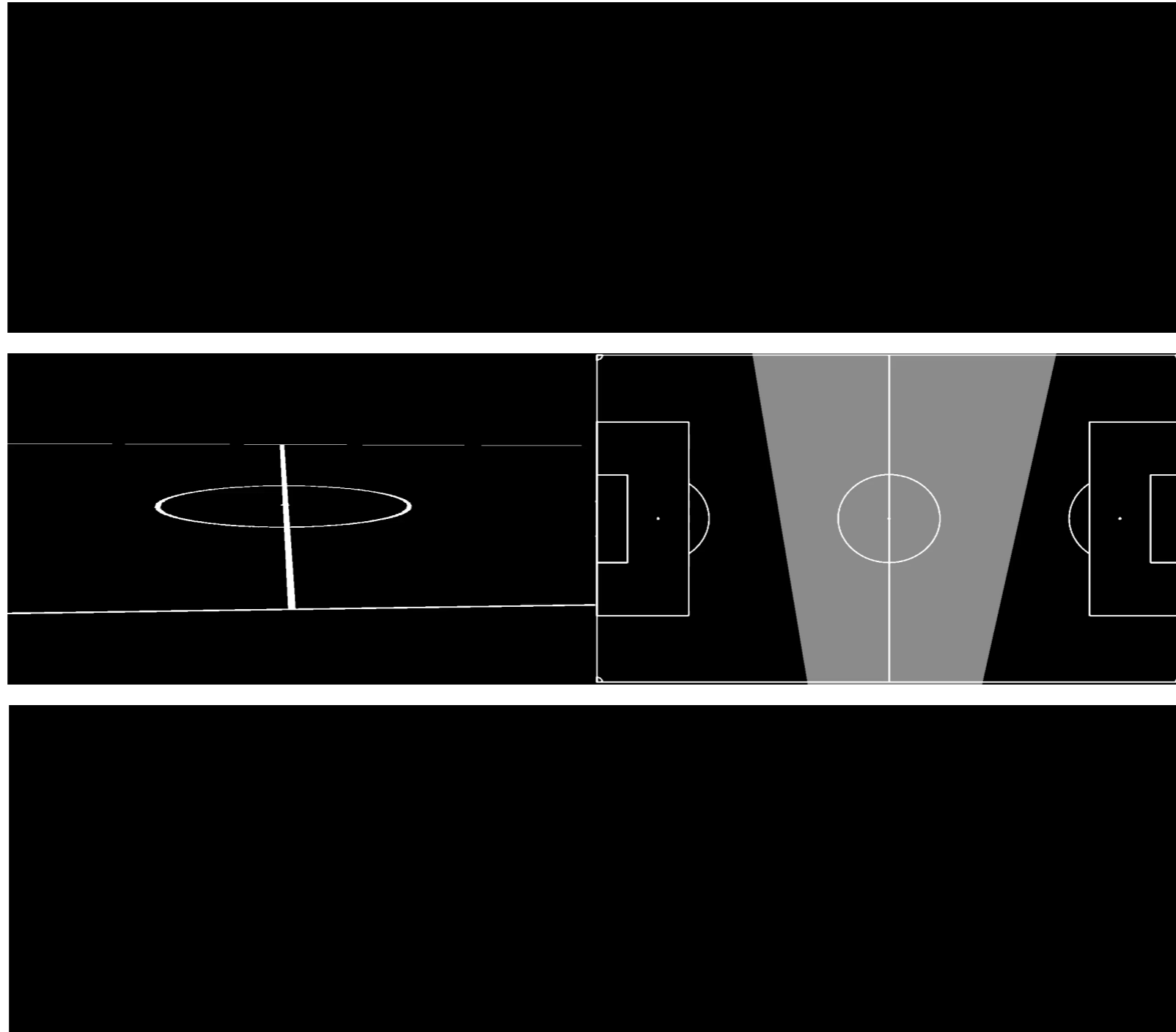
Pipeline

- Get the broadcast image and apply preprocessing to get edge image.
- Use the HoG feature of the processed image to find nearest neighbour in the dictionary.
- Corresponding transformation of the synthetic image is the required transformation.



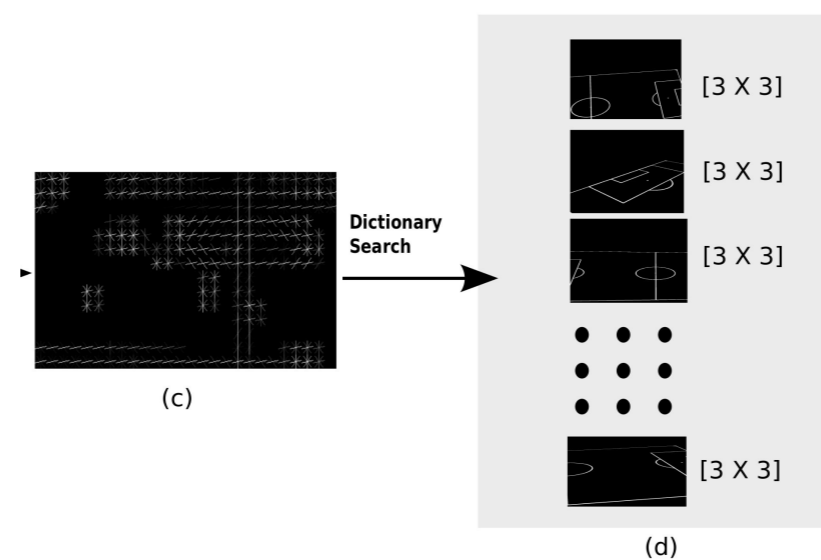
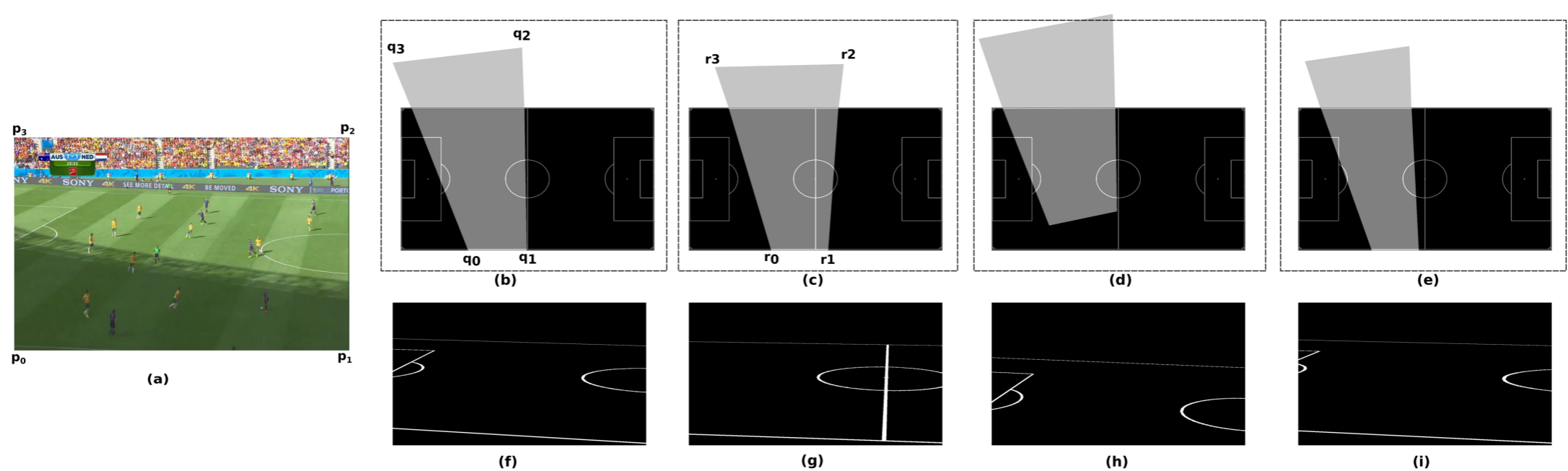
Methodology

- Simulate the viewpoints which are likely to occur and store a feature dictionary
- Matching features does not require any correspondences



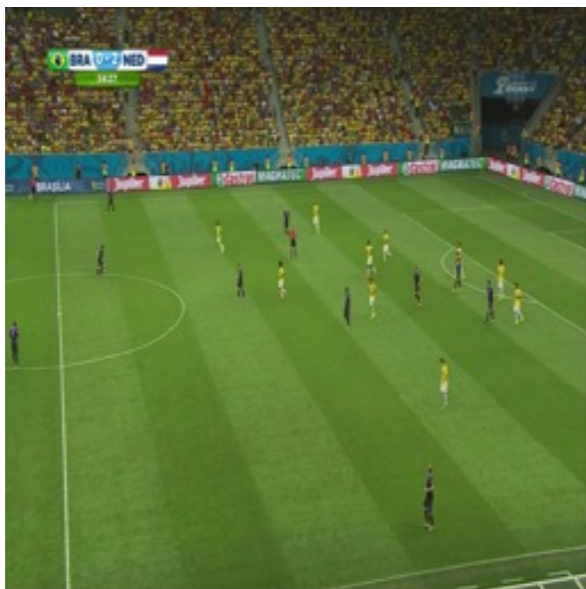
Dictionary Generation

- For each simulated viewpoint, generate the corresponding HoG feature and store in a dictionary.



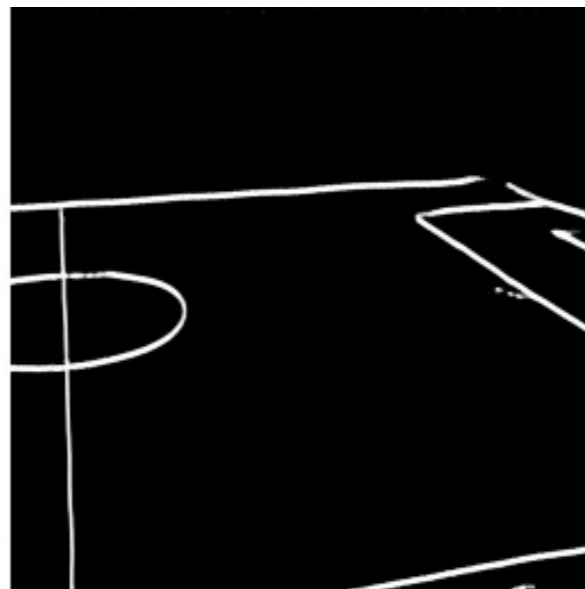
Preprocessing Broadcast Image

- Given a new broadcast image, we perform some preprocessing to get a “cleaned up” edge map
- We use pix2pix for the preprocessing
- Given a RGB and segmented image as a pair we train a pix2pix to learn the transformation



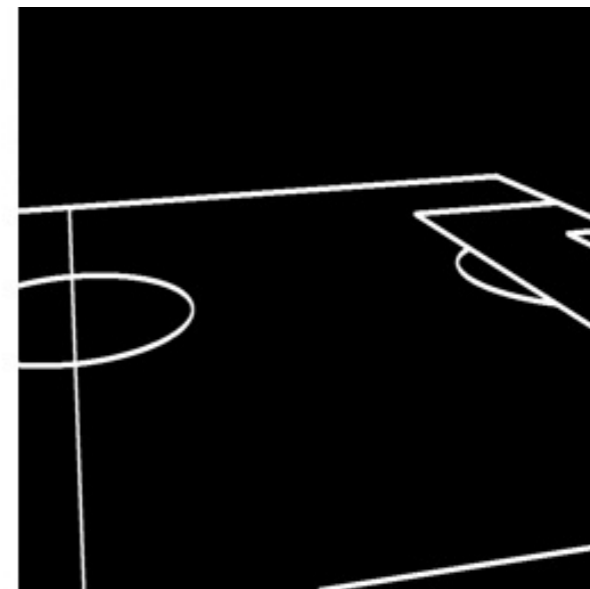
(a)

RGB image



(b)

Output

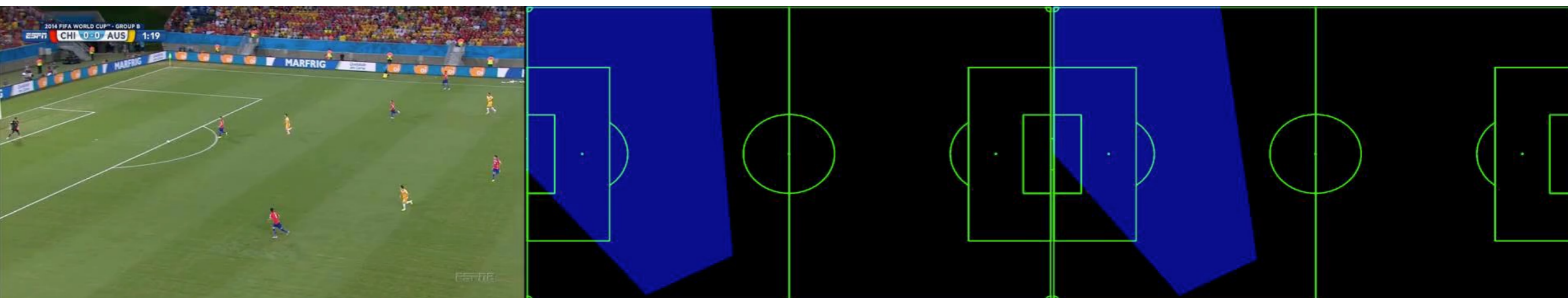
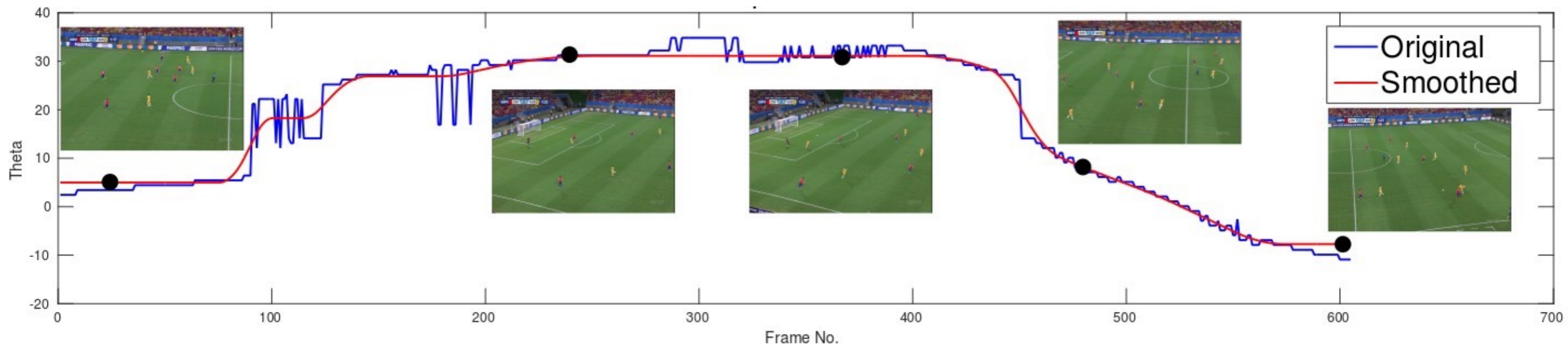


(c)

Ground Truth

Temporal Smoothing for Video

- While this method works on a per-frame basis, we can utilize the results of the nearby frames, with certain constraints to smooth the prediction.



Evaluation

	Mean Accuracy	Time (s)
DSM	83	.44
Ours	91.4	.21

Trained and tested on DSM* Dataset

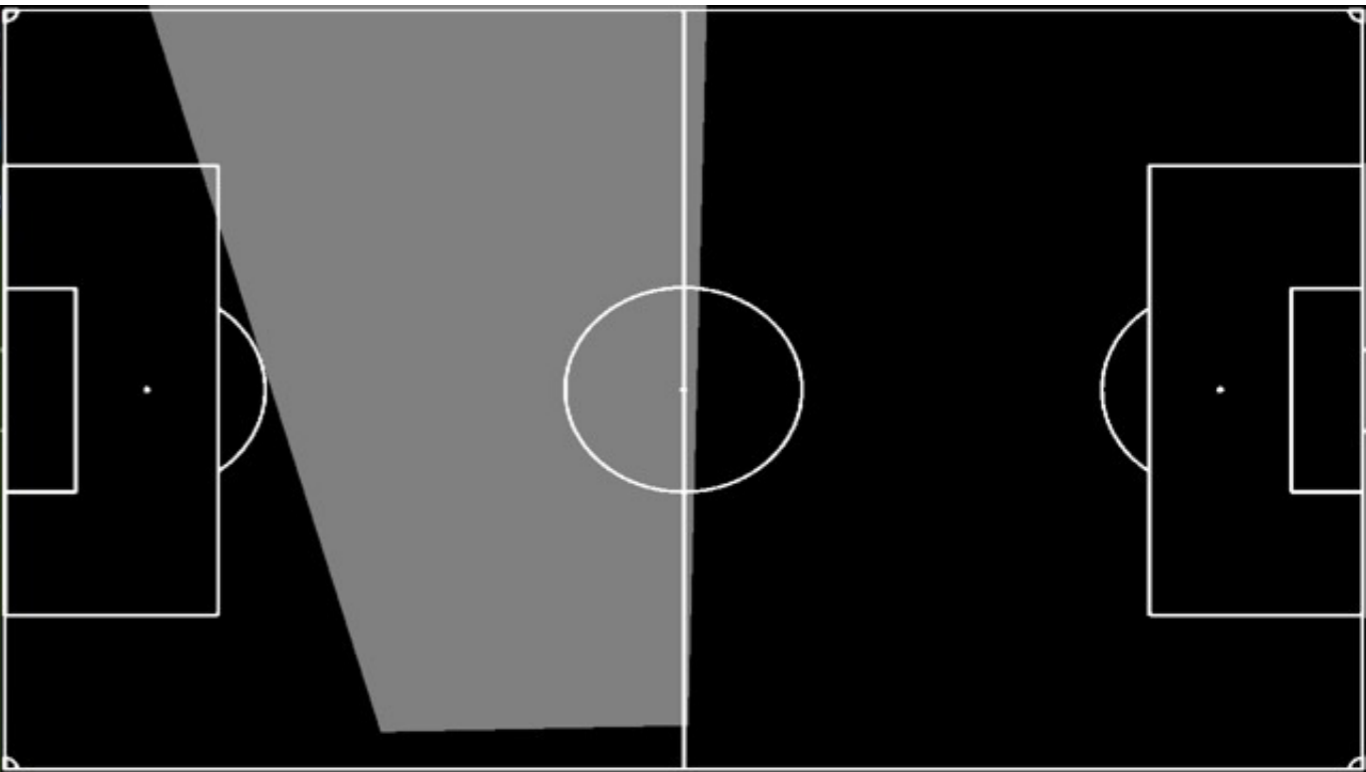
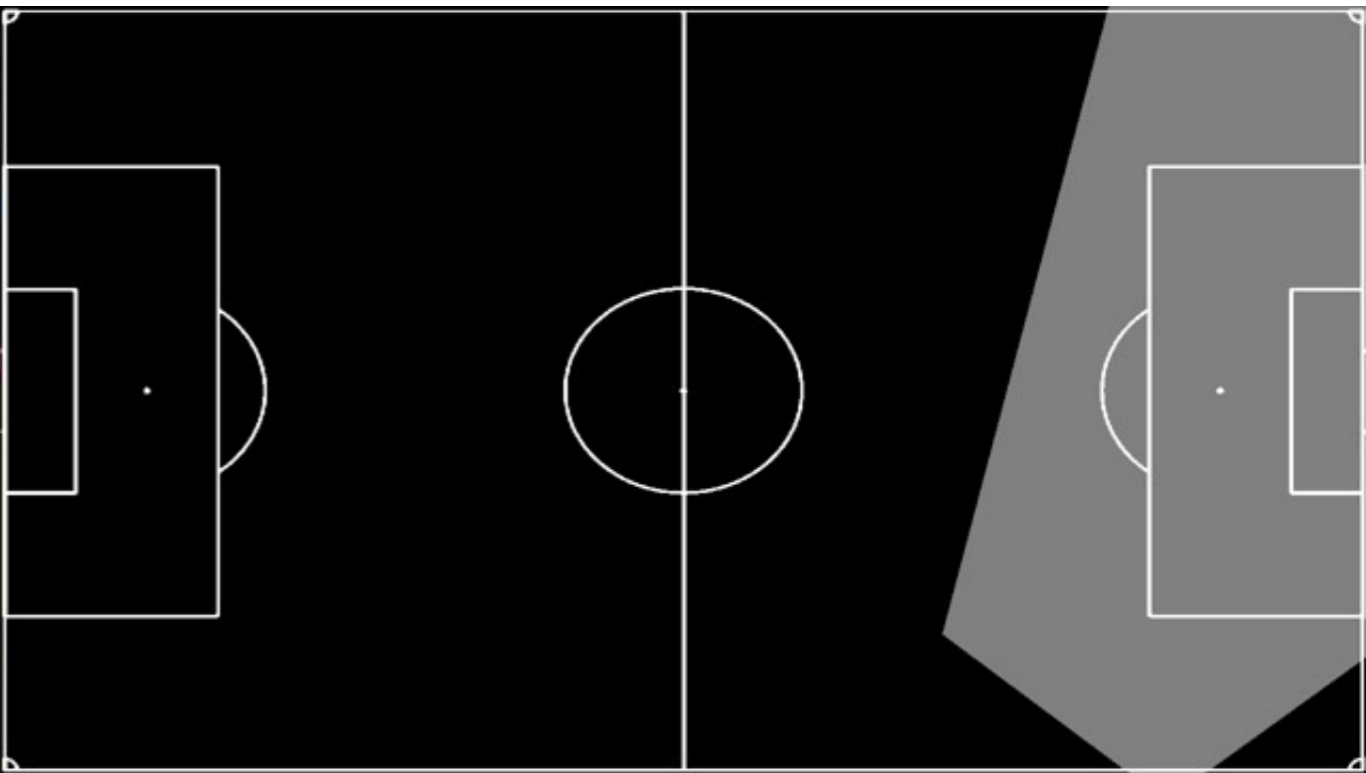
Accuracy		
	Mean	Median
DSM test Data	91.4	92.7
Our test data	76.3	85.6

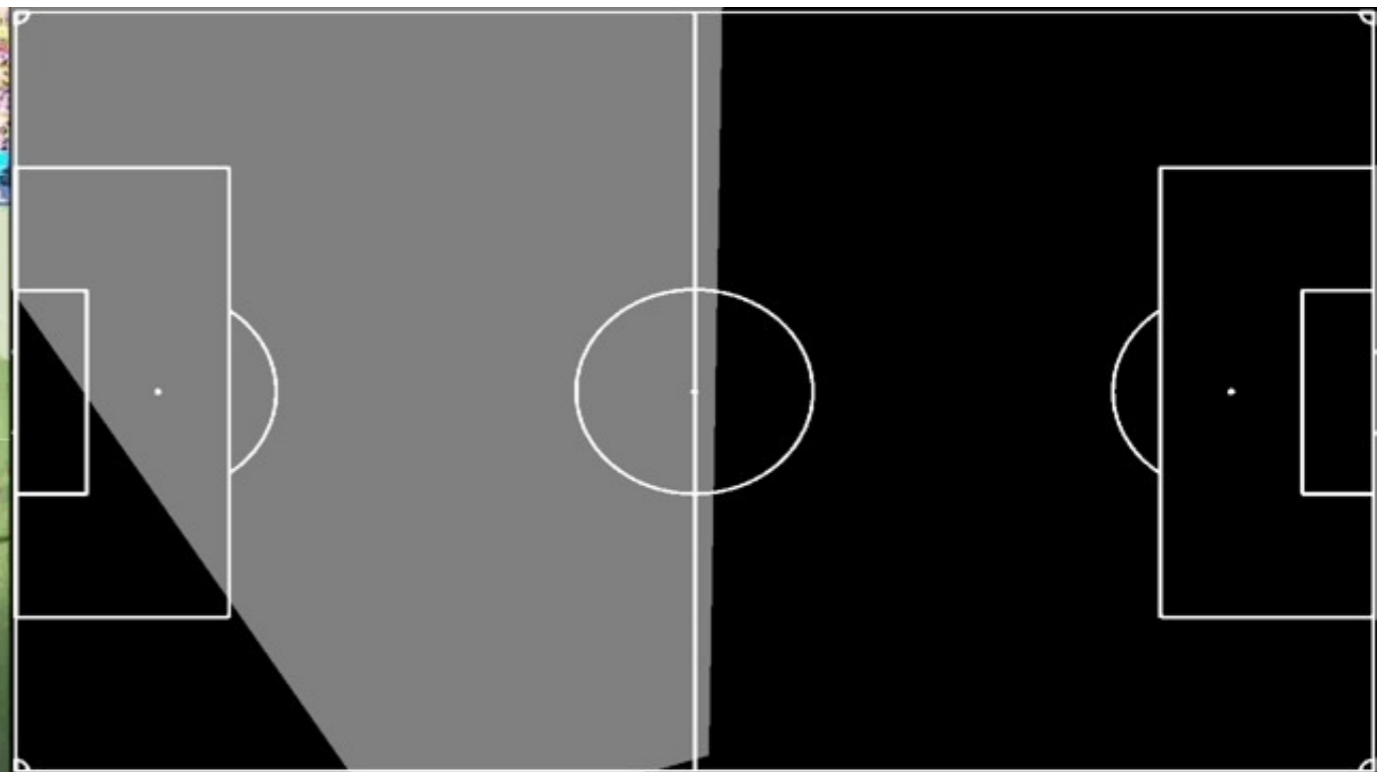
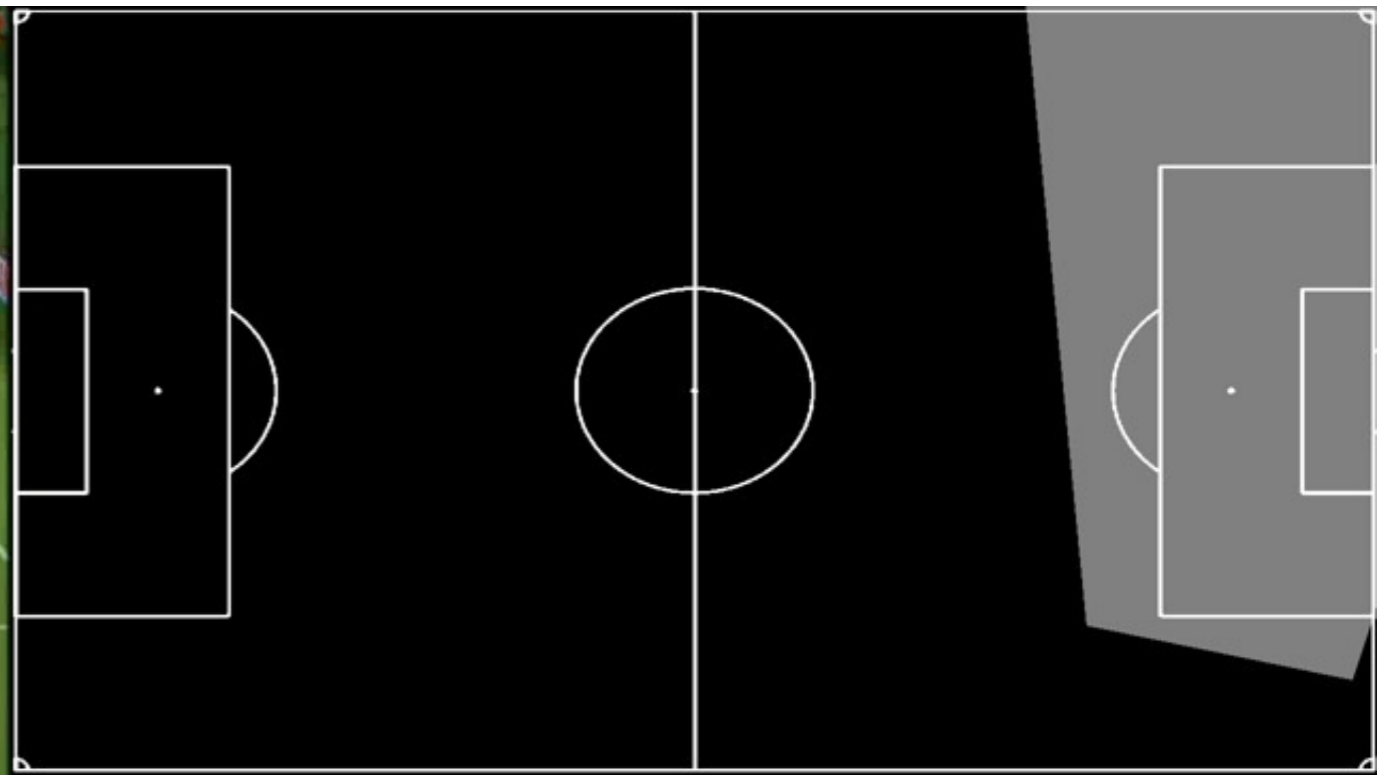
Trained on DSM Dataset

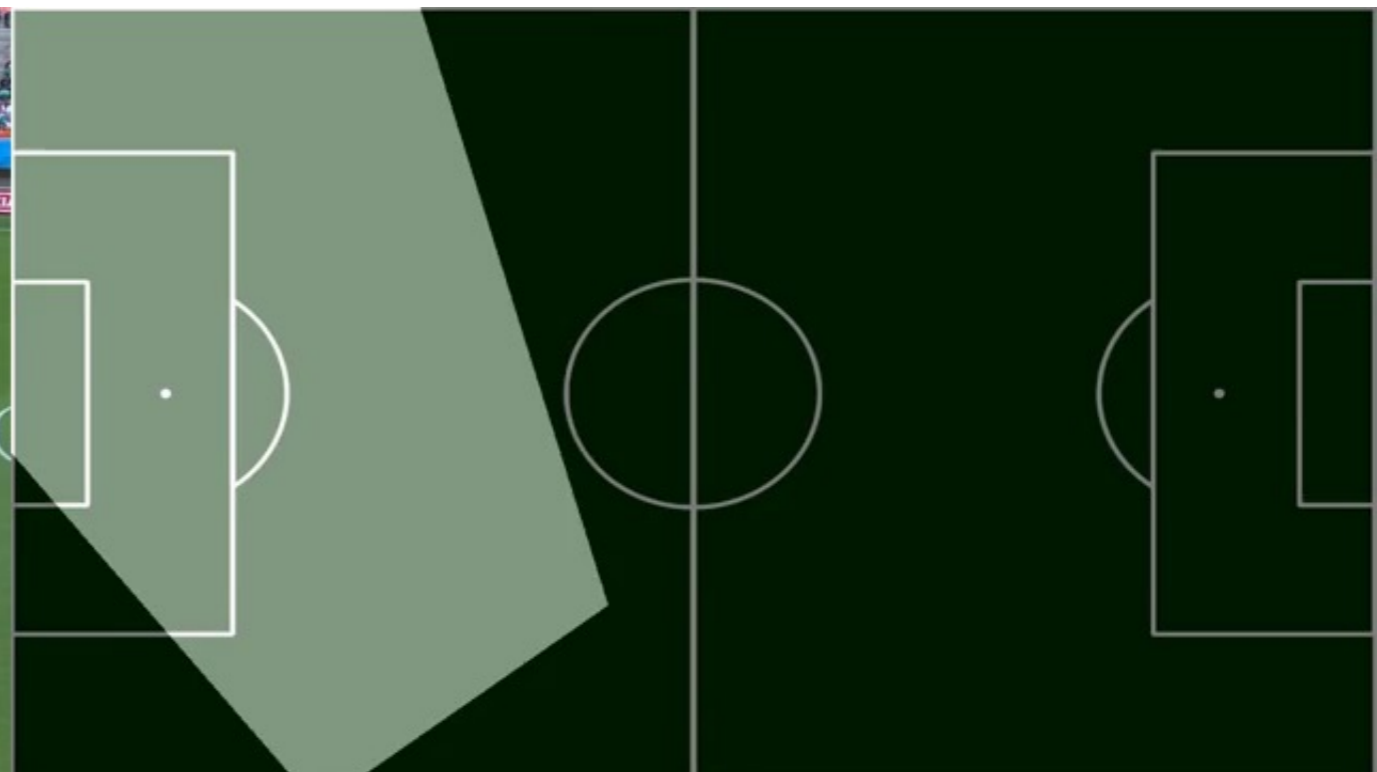
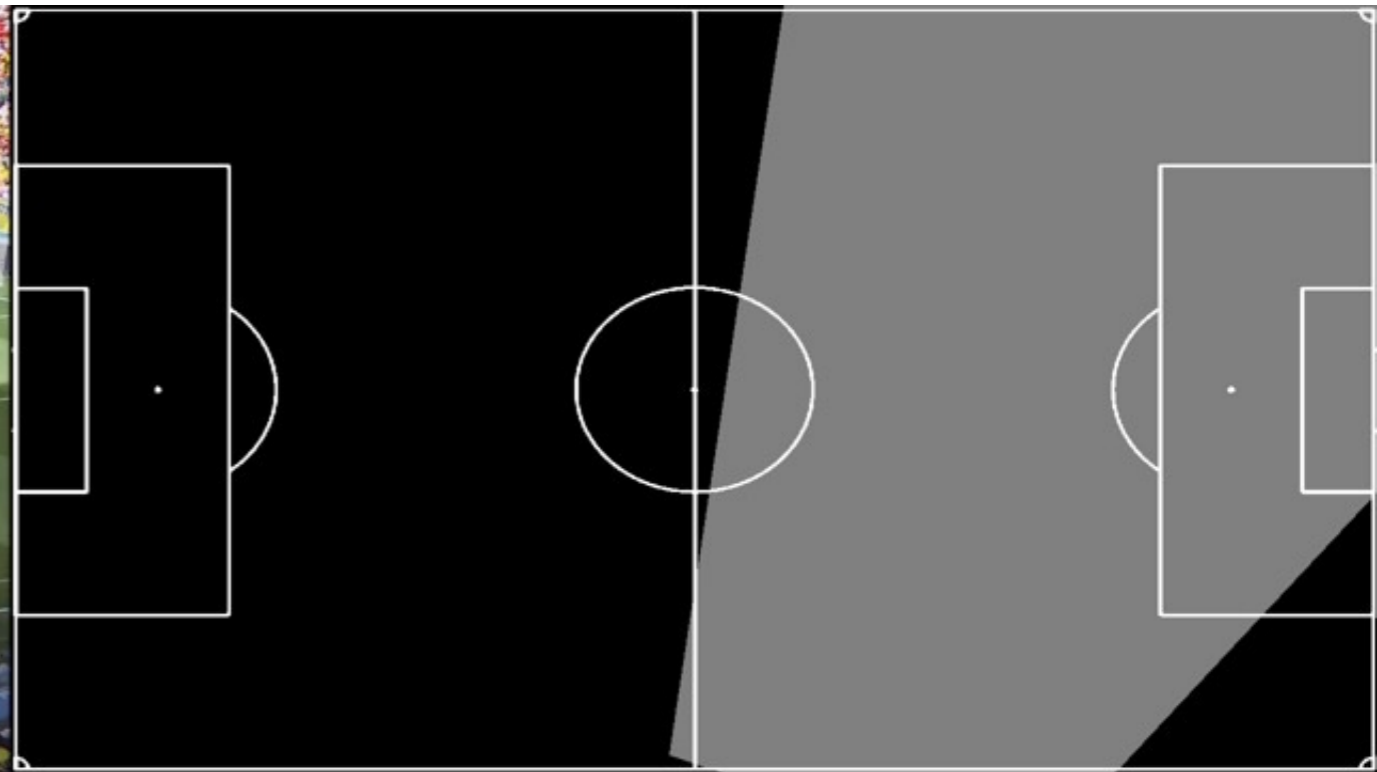
Accuracy		
	Mean	Median
DSM test Data	88.8	90.8
Our test data	88.4	90.6

Trained on Our Dataset

* Homayounfar Namdar, Sanja Fidler & Raquel Urtasun: Sports Field Localization via Deep Structured Models, CVPR 2017







Thank You