

Hockey Vision: Deep Learning and Hockey Analytics

An Open Source Project

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About me



Motivation

Analytics Today



Emmanuel Perry,
corsica.hockey

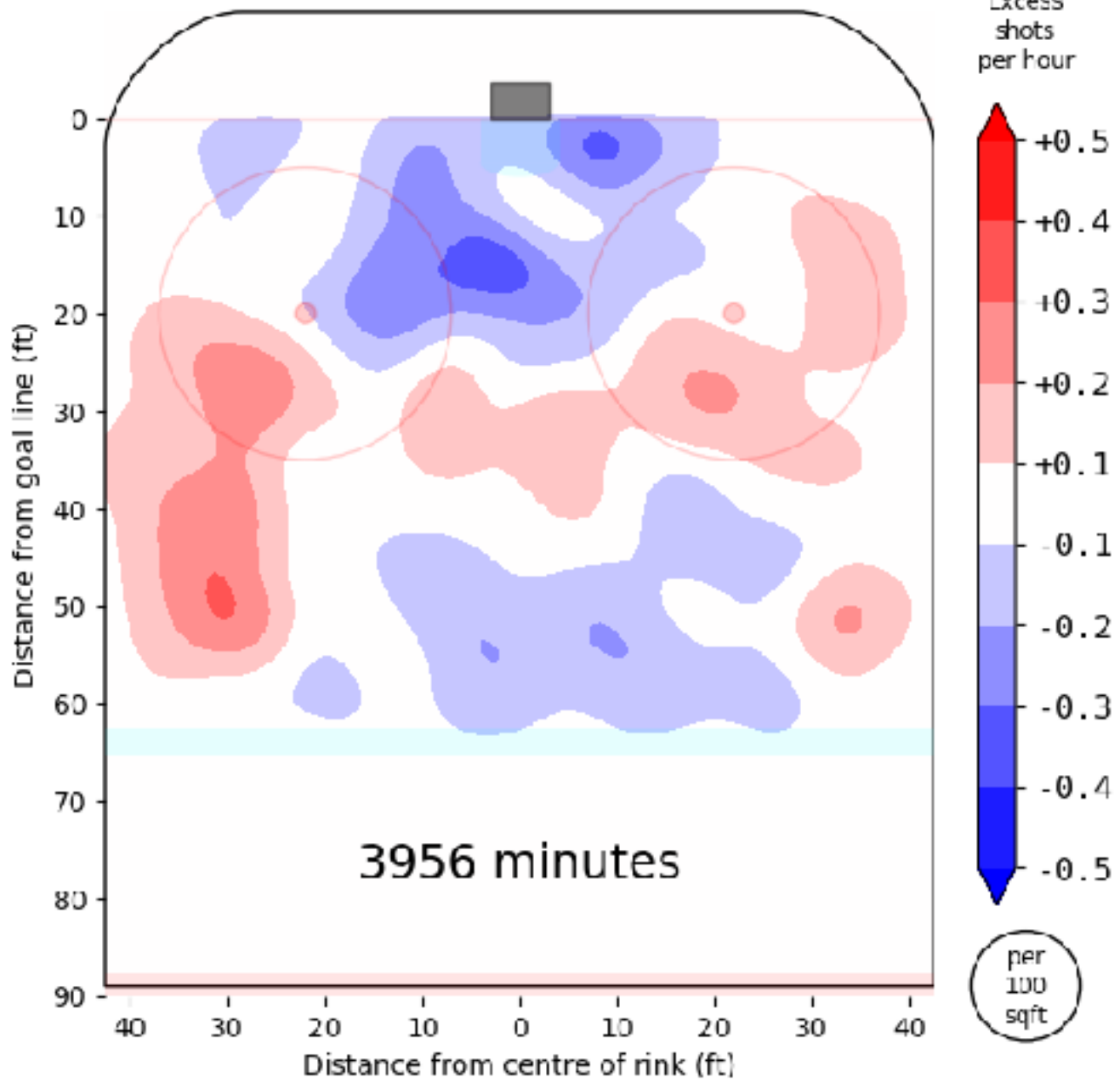


- Updated translation factors
- .74 KHL
 - .58 SHL
 - .47 AHL
 - .43 SM-Liiga, Swiss NLA, NCHC
 - .38 H-East
 - .33 Big 10
 - .30 OHL
 - .29 WHL
 - .25 QMJHL
 - .23 ECAC

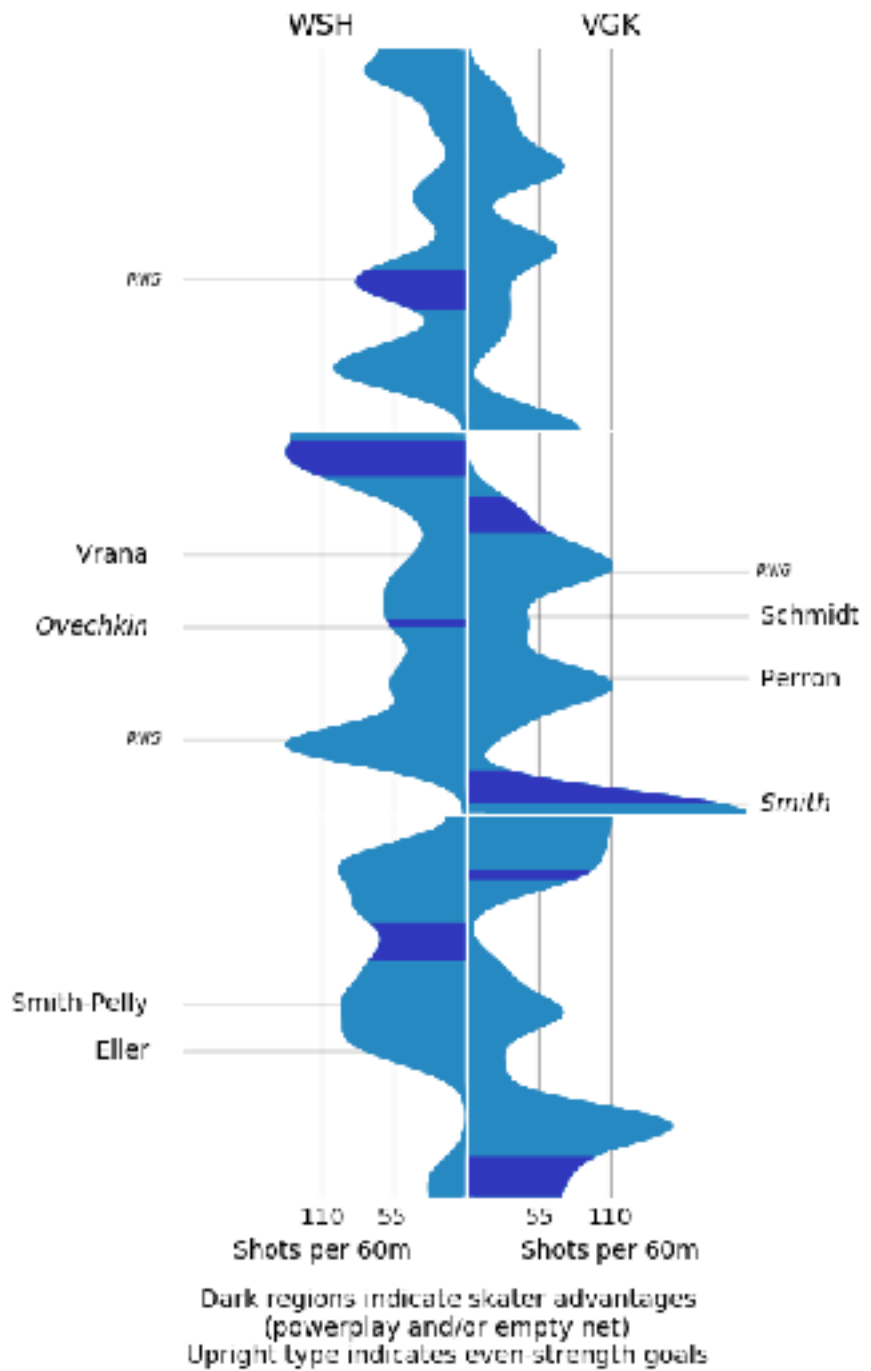
Following

Rob Vollman, Hockey
Abstract

5v5 Unblocked Shot Rates (For), L.A 2017-2018
Relative to League Average for the Season
Micah Blake McCurdy, @IneffectiveMath, hockeyviz.com

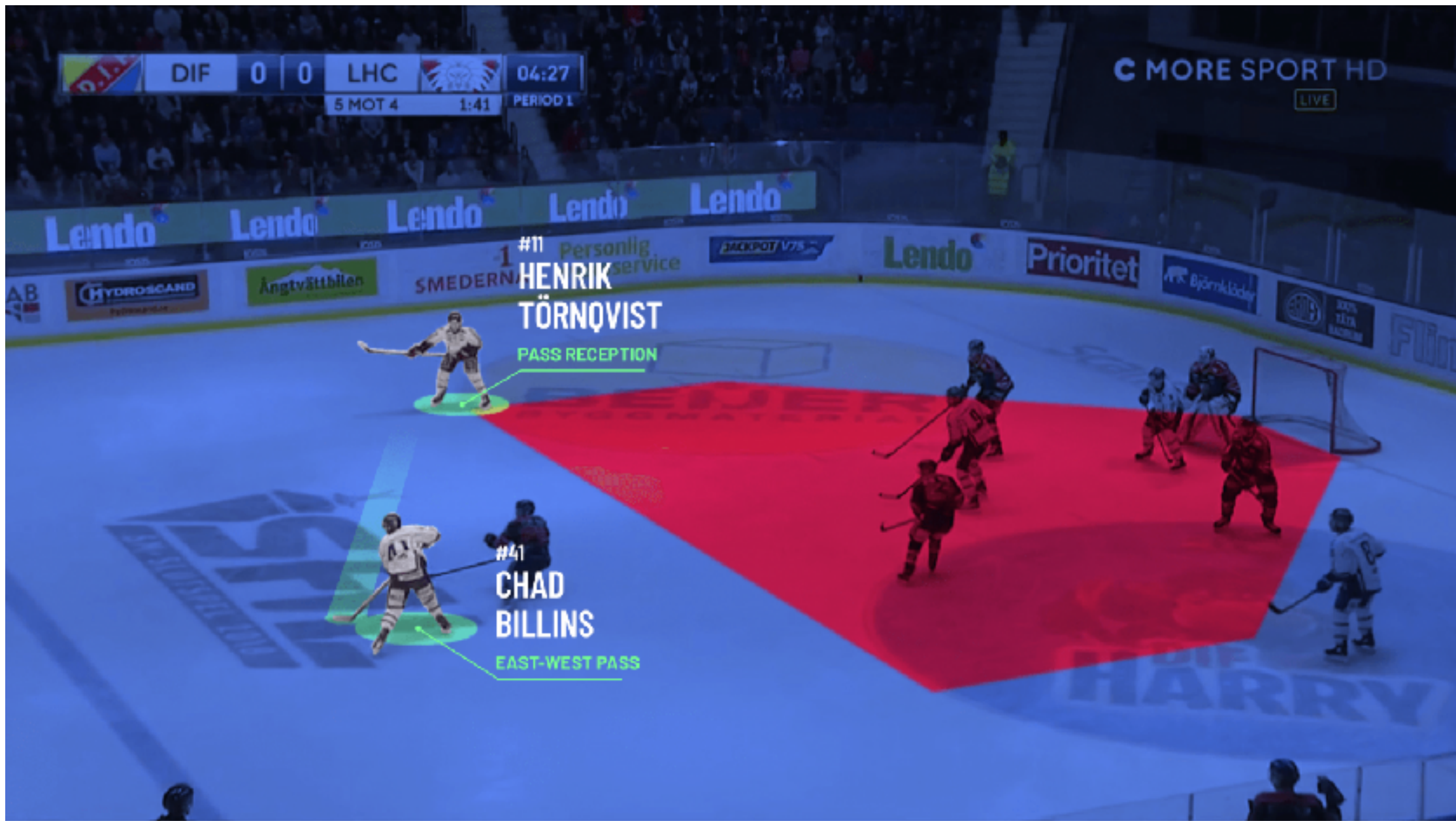


Shot pressure, WSH at VGK, 07 Jun, 2018
Micah Blake McCurdy, @IneffectiveMath, hockeyviz.com

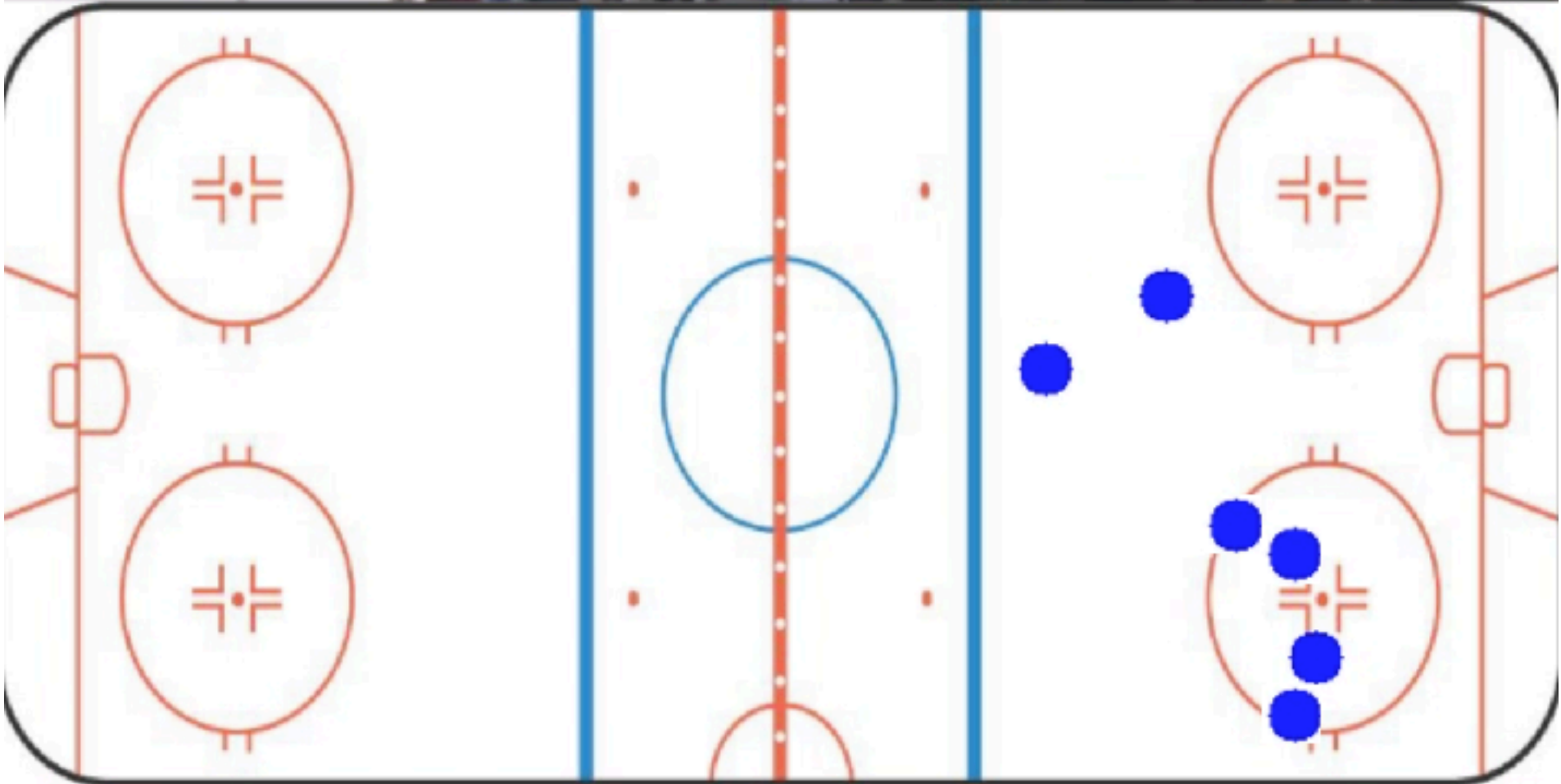


Micah Blake McCurdy,
hockeyviz.com

What's next?

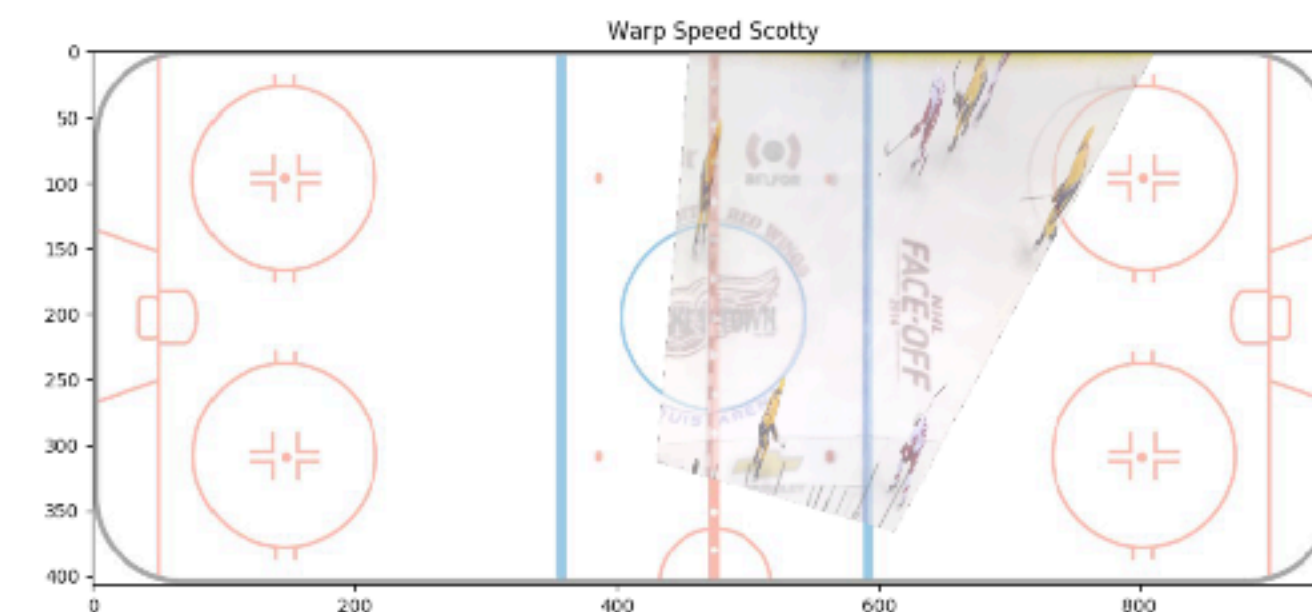


Objective: Player Mapping



Technical Goals

- Gather and label data
- Train an object detection network
- Develop a homography detection system



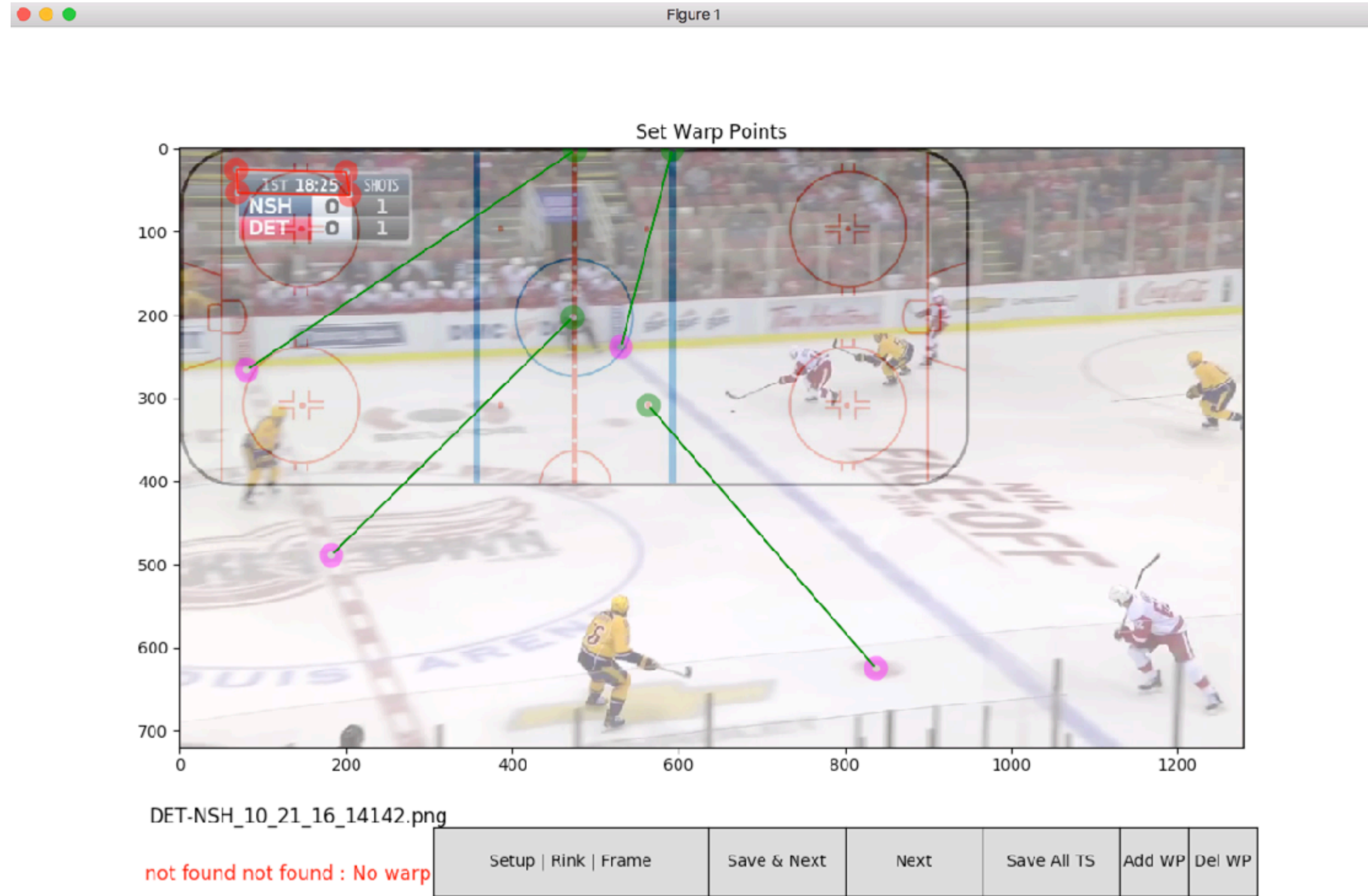
Data Pipeline Management and Cloud Services



Data Collection and Labelling

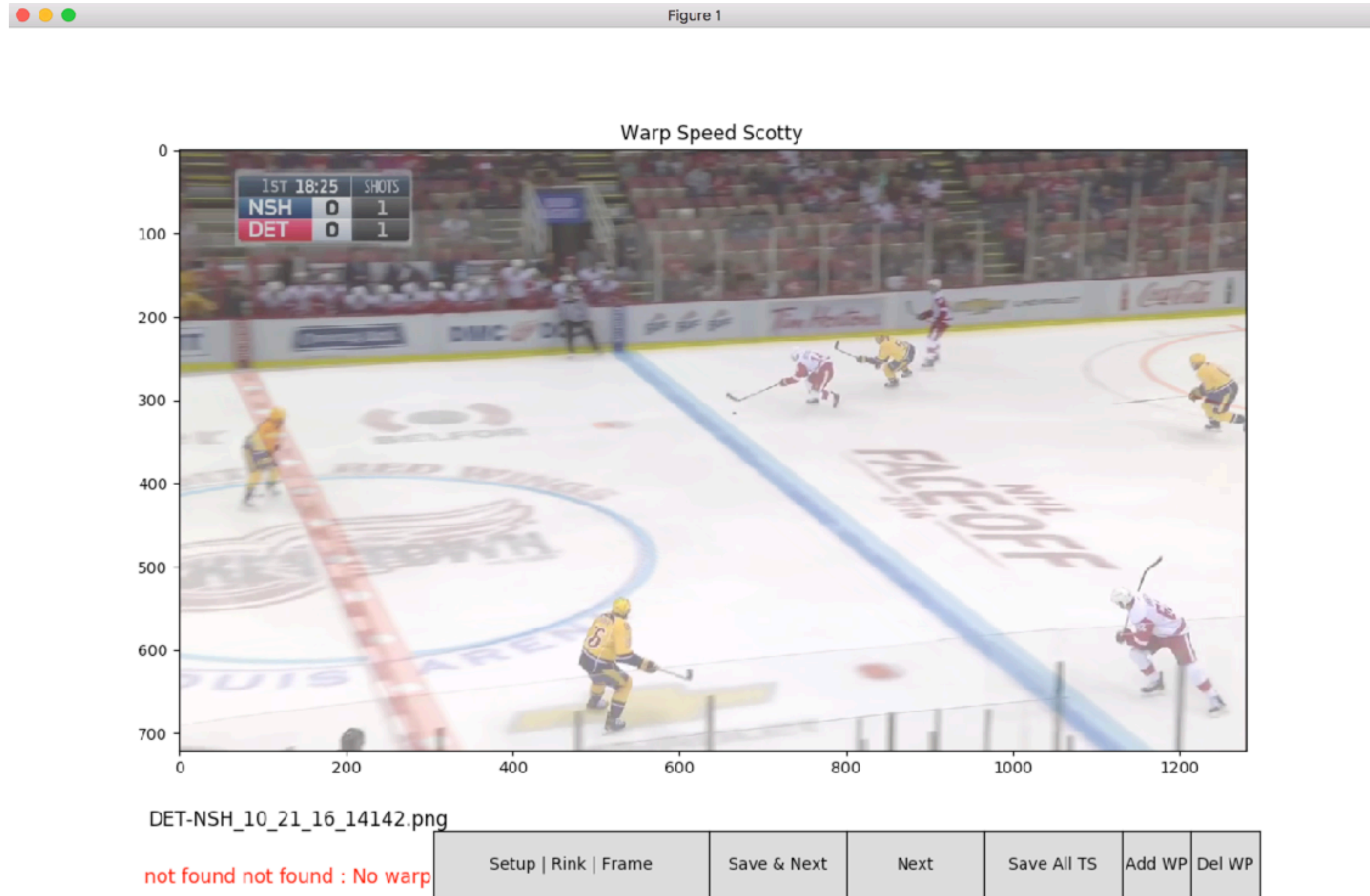


Data Collection and Labelling



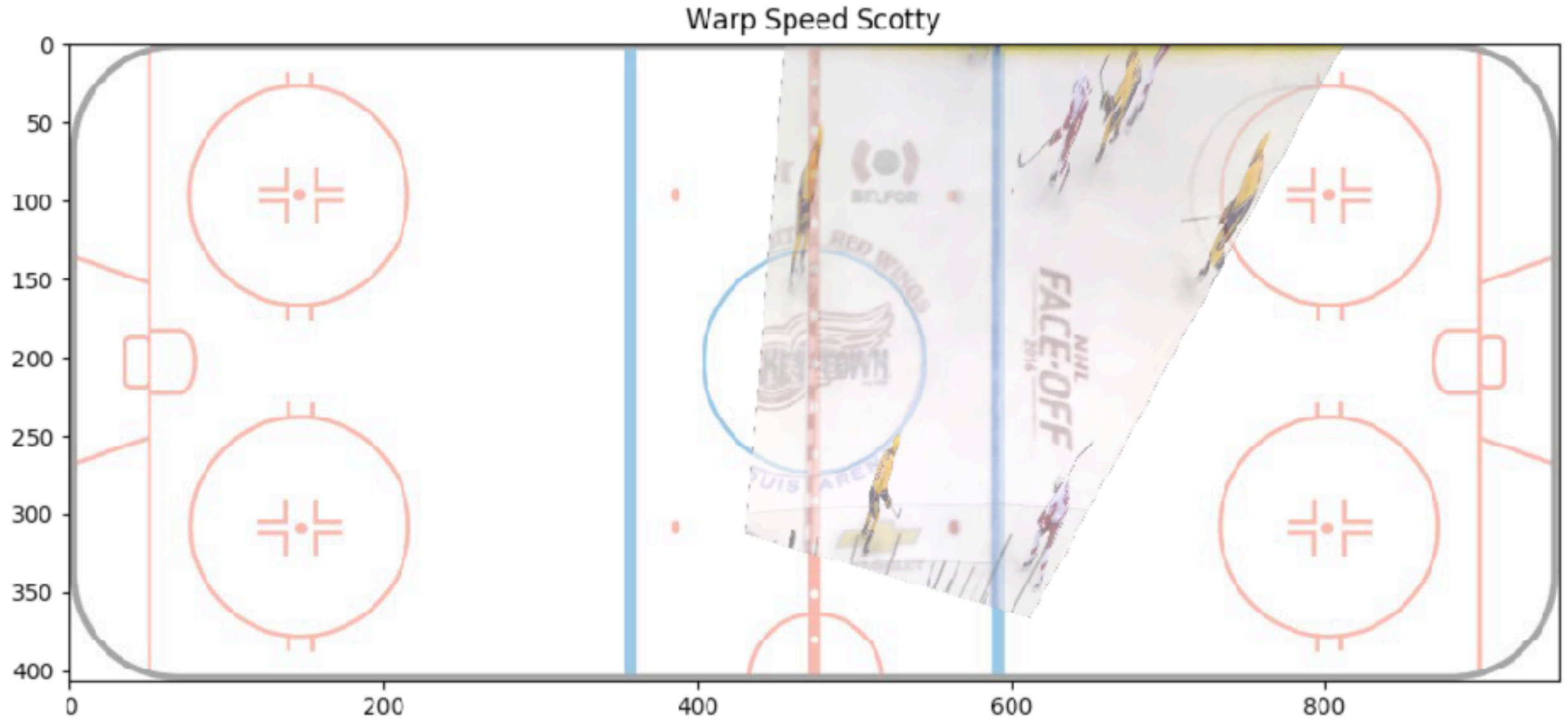
x=263.758 y=415.93

Data Collection, Labelling and Training



Data Collection, Labelling and Training

Figure 1



DET-NSH_10_21_16_14142.png

not found not found : No warp

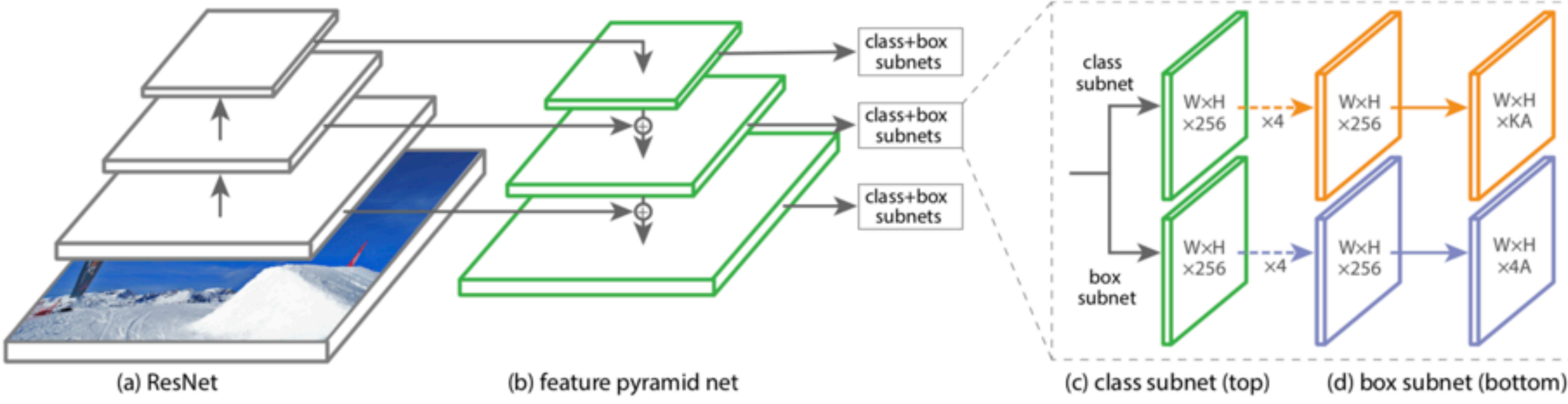
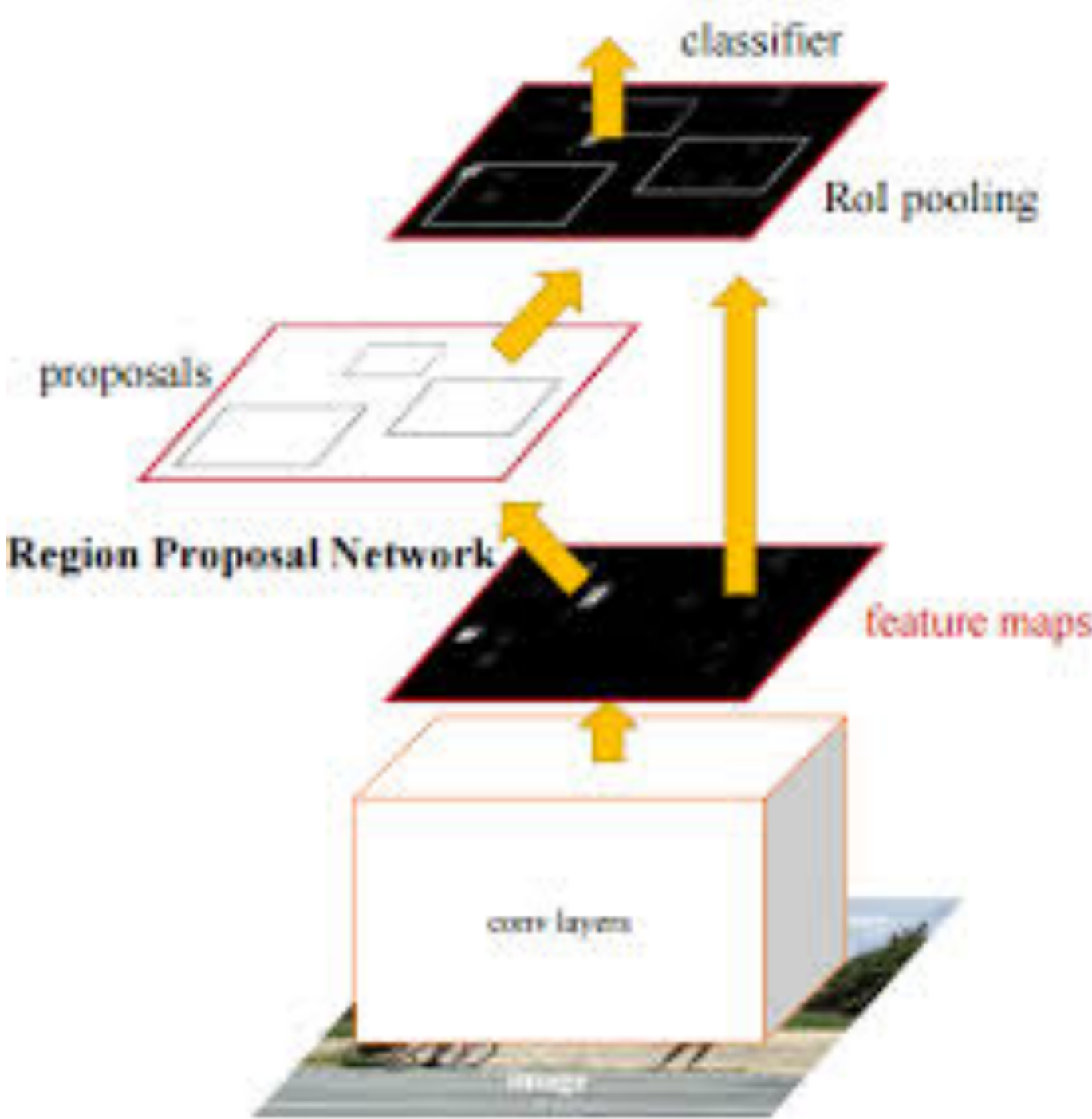
Setup Rink Frame	Save & Next	Next	Save All TS	Add WP	Del WP
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x=88.371 y=243.86 [0, 0, 0, 0]

Object Detection

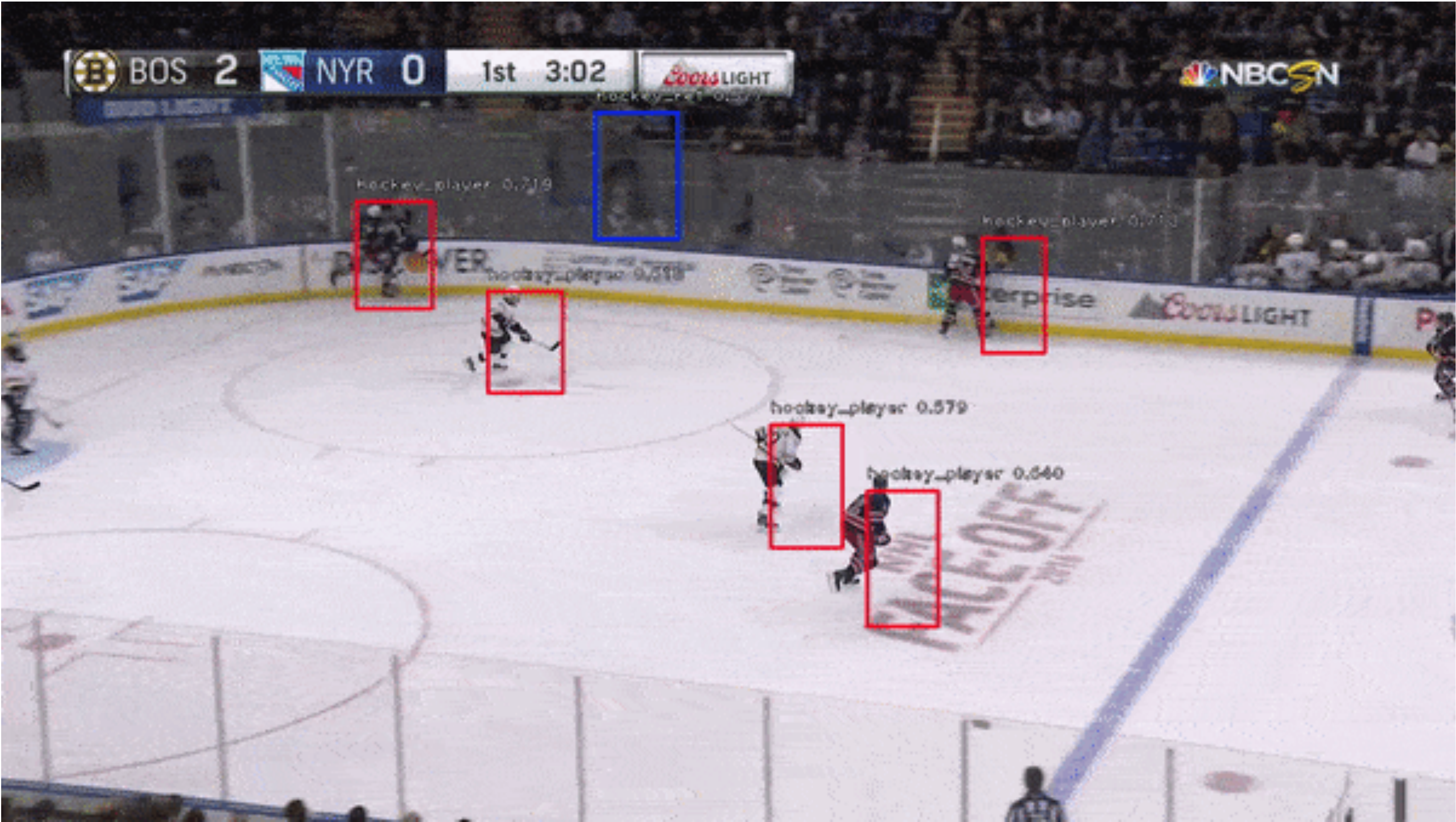
Faster RCNN & RetinaNet



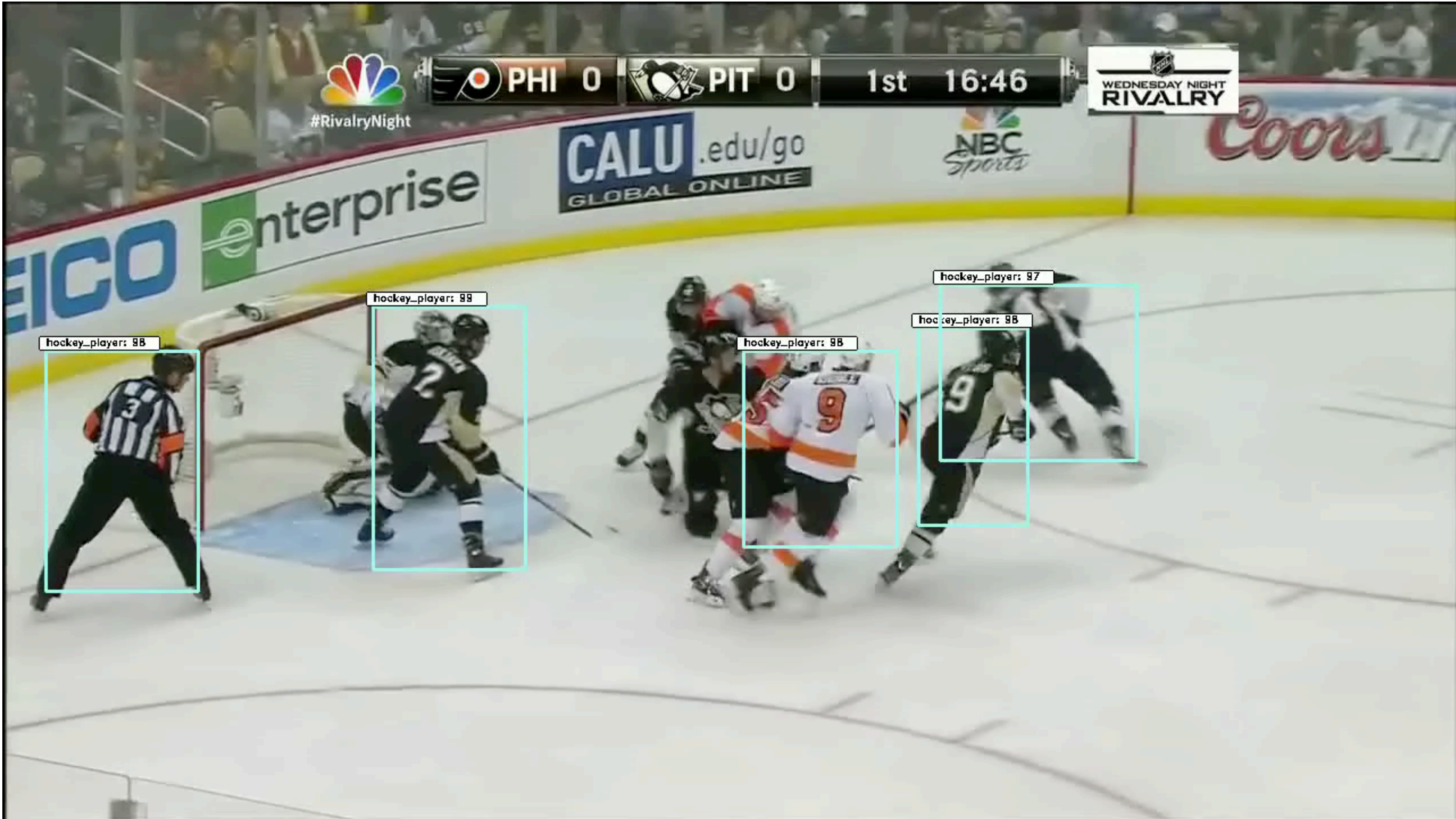
Ren et al.
[arXiv:1506.01497](https://arxiv.org/abs/1506.01497) [cs.CV]

Lin et al.
[arXiv:1708.02002](https://arxiv.org/abs/1708.02002) [cs.CV]

Player Detection



Player Detection



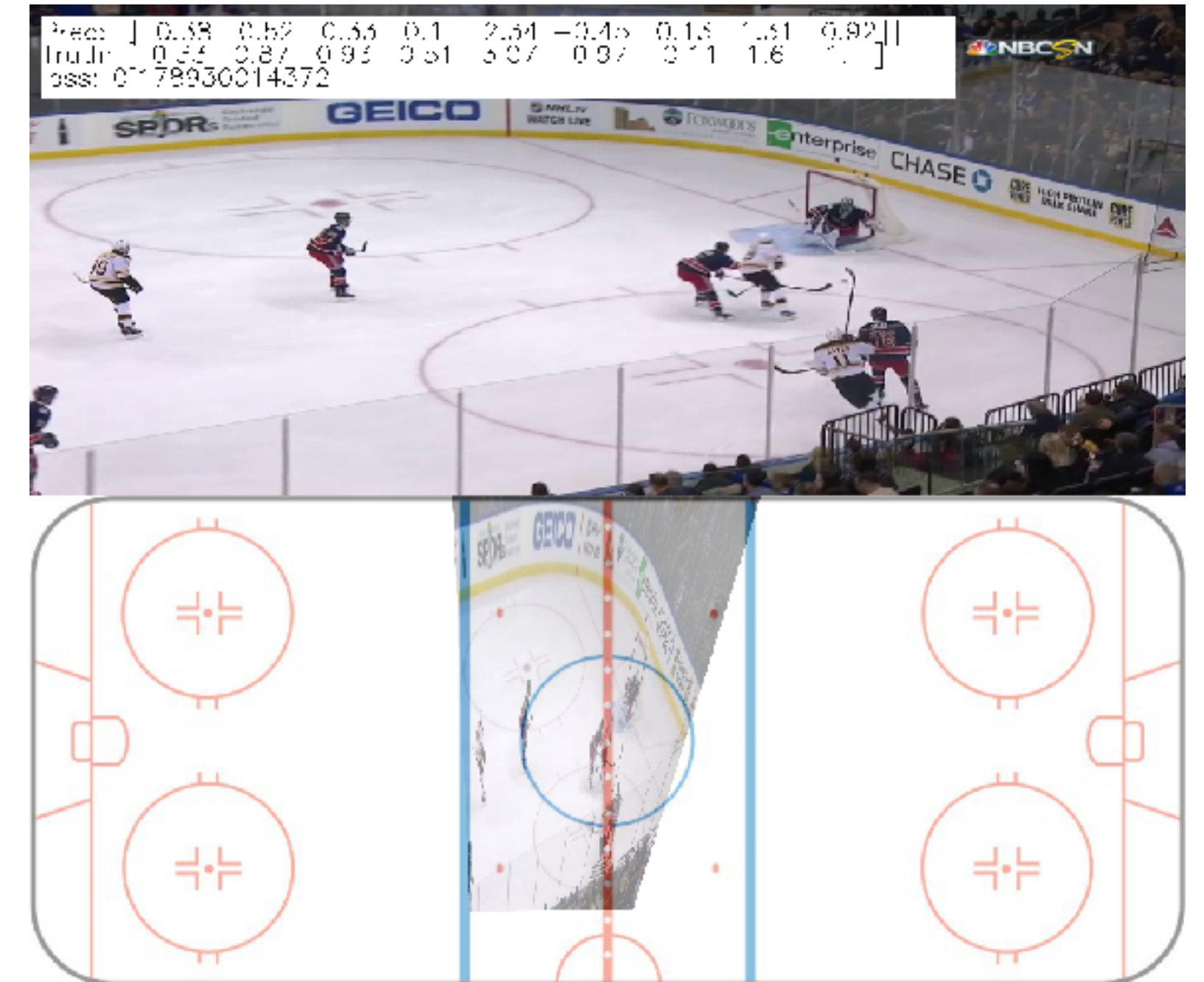
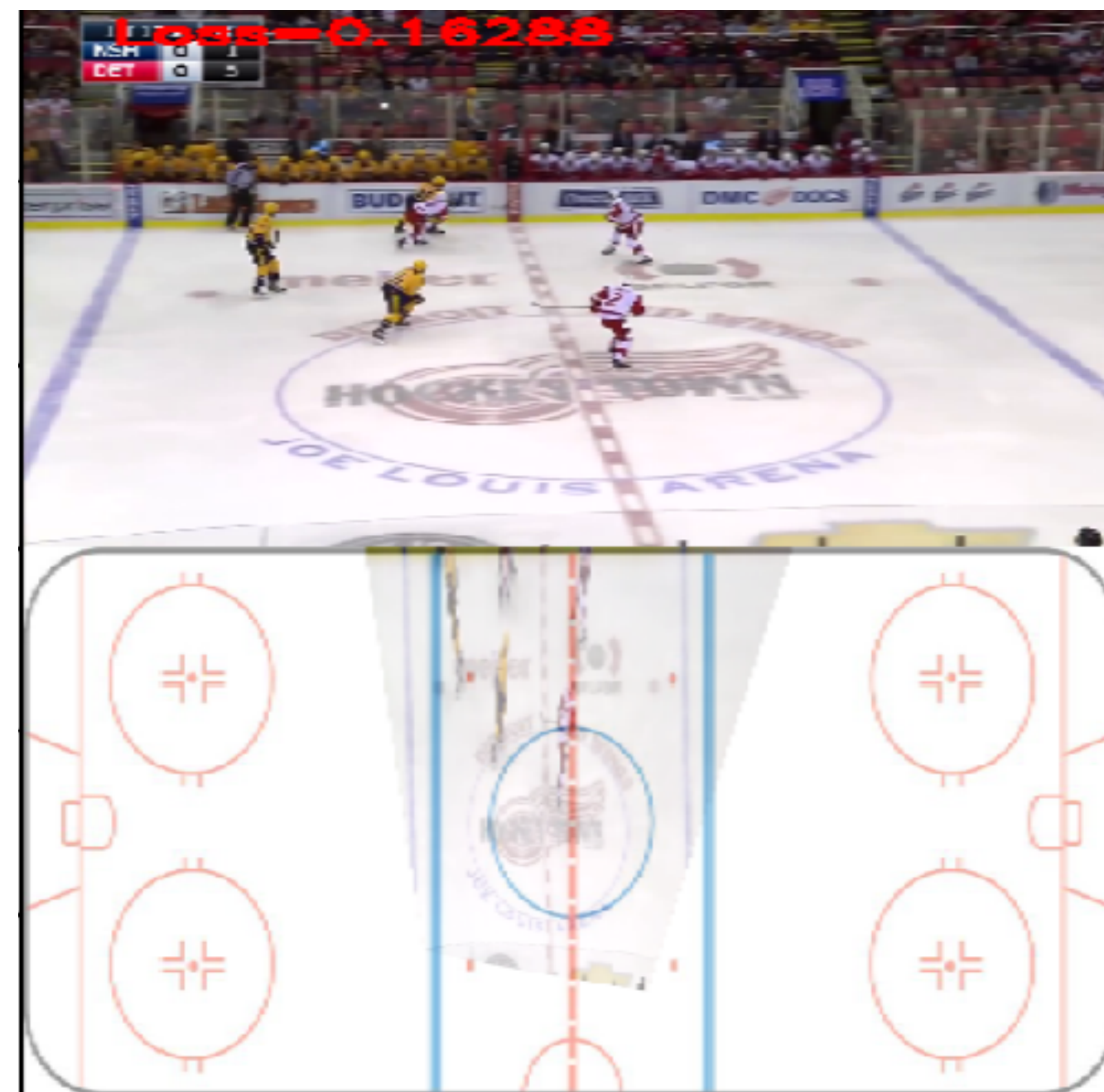
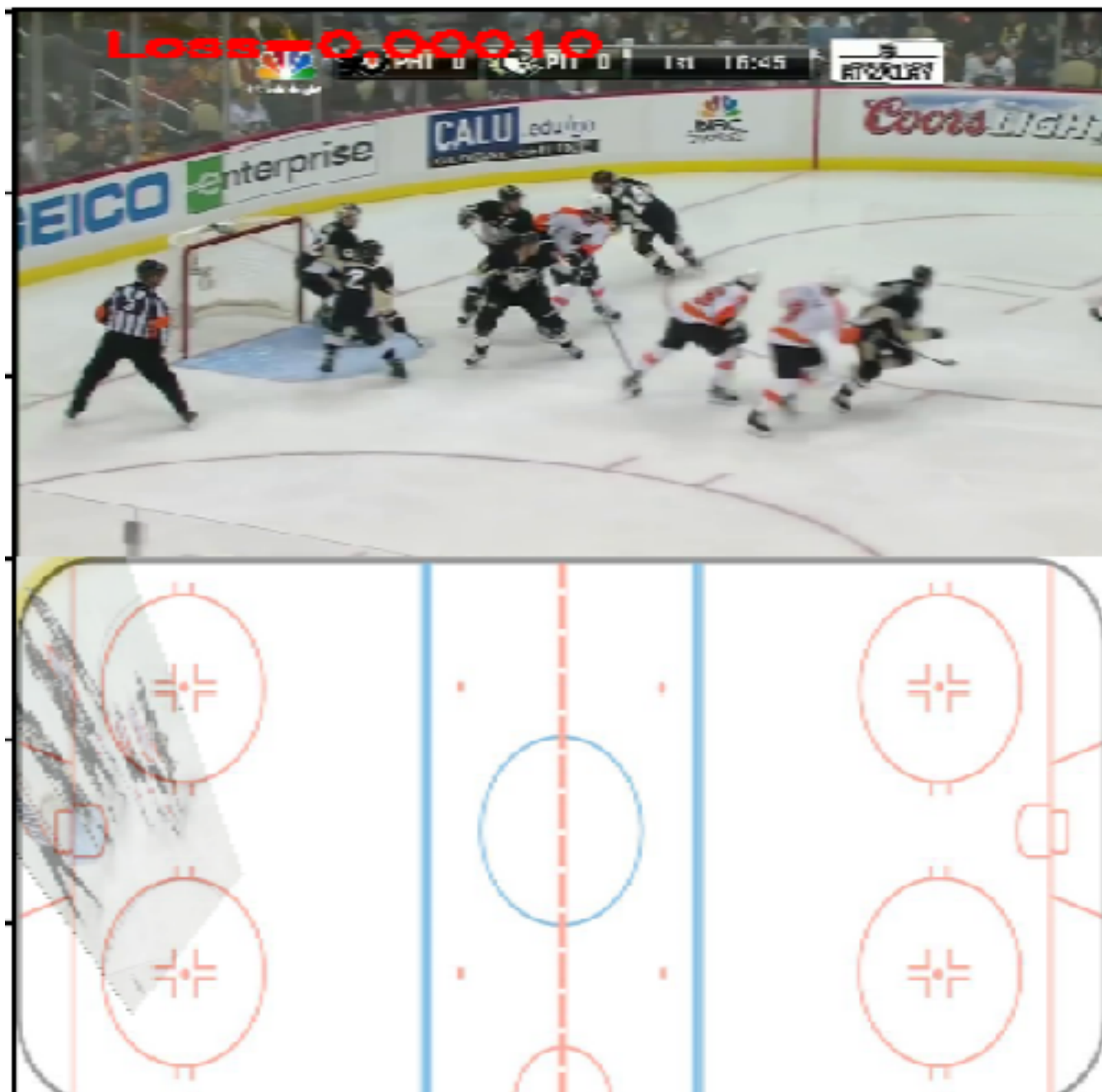
Homography Detection

InceptionV3



Szegedy et al.
[arXiv:1512.00567](https://arxiv.org/abs/1512.00567) [cs.CV]

Homography Detection



InceptionV3

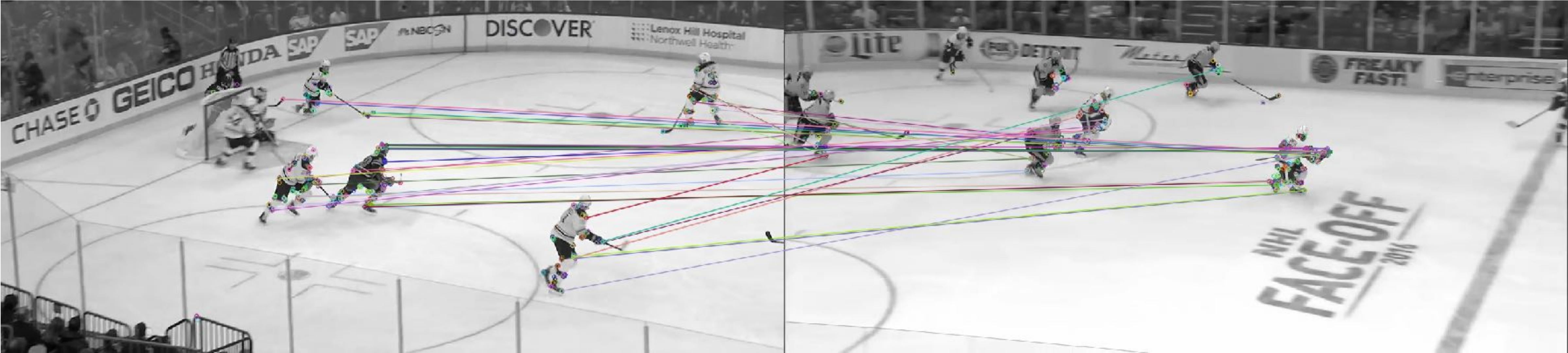
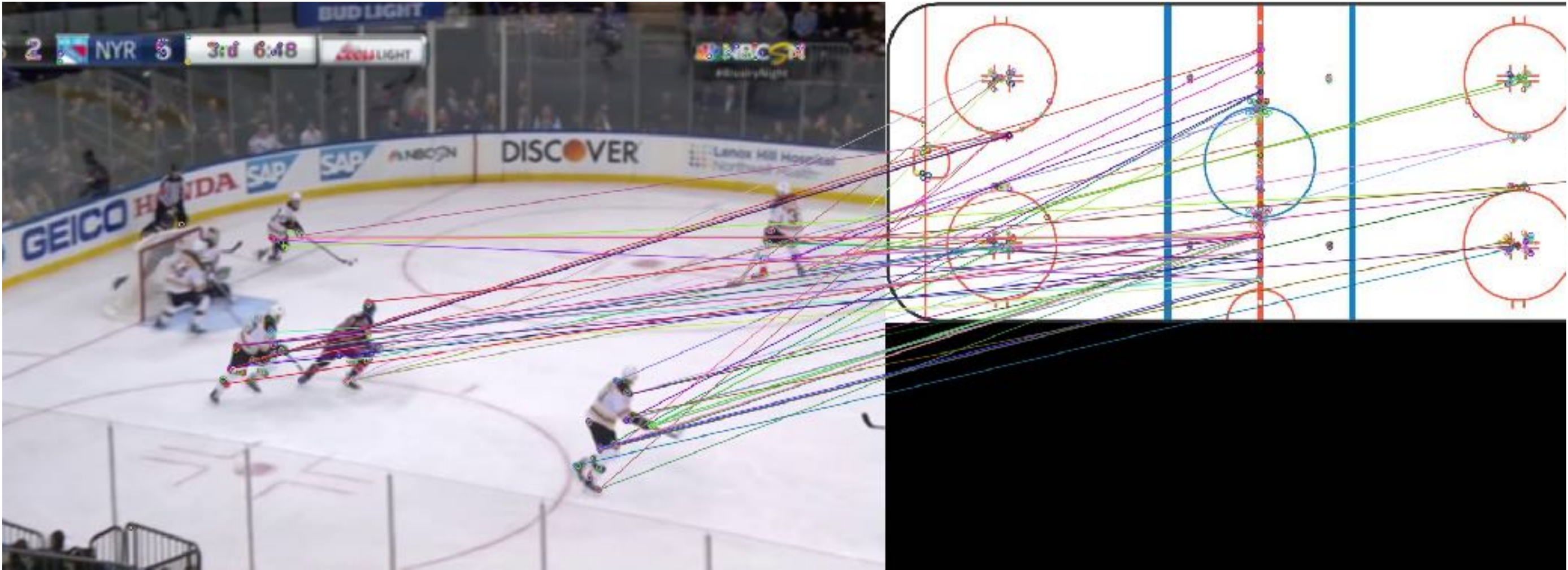


Szegedy et al.
[arXiv:1512.00567](https://arxiv.org/abs/1512.00567) [cs.CV]

Color Filtering



Finding Homography



Complications

- Object Detection
 - Would benefit from recurrent networks and tracking
- Homography Detection
 - Overfitting
 - Data needs to be diverse!
 - Never enough (labelled) data

Player Mapping — A Cherrypicked Example



Applications in Hockey Analytics?

- Measure time spent in each zone
- Analyze a players tendencies on the ice
- Investigate positioning at the time of a goal for/against
- Identify plays and patterns, such as PP entries, to gauge effectiveness

Future Projects

- Tracking
- Player Identification
- Activity recognition
 - Labelling passes, zone entries and more
- Pose estimation

Thanks!

Campbell Weaver

[GitHub.com/ccweaver1/bsi_vision](https://github.com/ccweaver1/bsi_vision)

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MEng in CS

Cornell Tech, NYC