Semantic segmentation for learning hockey broadcast image representation

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Abstract

In this project, we propose a novel way to recognize key locations within hockey broadcast images using semantic segmentation and convolutional neural networks (CNN). The semantic representation of an image could then be used for many applications such as mapping a broadcast image into a 2D plan. All the codes that aimed to realized that project and that article are hosted on that GitHub repository.

1 Introduction

Computer vision is a growing field that changed the faces of many applications in robotic, security or even health sectors. Another field that is currently having more and more interests in such computer vision applications is the sports analytics. The professionnal sports clubs are using analytics and data to understand as more as they can the game and the performances of their players and their opponents. To increase that understanding, you often need a bunch of experts analyzing a bunch of data. Computer vision is well suited to extract that data because it allows the detection of many events simultaneously, which otherwise may have been done by many humans. In order to extract that data properly, it's way more interesting to map those events on the field (or the ice). To do so, it's often necessary to understand the general representation of the moment (or the image), which could be done by a computer vision task called semantic segmentation.

In his work, Homayounfar et al. (2017) present a methodology where he uses different cues on the field such as lines, corners, circles and so on to train another model that position the field in a 2 dimensionnal plan. In our project, we tried to improve the cues detection technic by training different semantic seg-mentation models and gain insights on how to train such models. The next step following that project will be to also use that representation in order to map players into a 2 dimensionnal plan.

In the next section, we will start by giving some background about the task of semantic segmentation (section 2), then we'll present our methodology (section 3), the dataset we used for our experiments (section 4), the results we had (section 5) and finally a conclusion (section 6).

2 Background

- Definir la tache
- dimensions workflow

3 Methodology

- Semantic segmentation (architerures, loss, data aug)
- mapping (plus short)

4 Dataset

Set up de metho de la pancarte + premier bout de dataset de la pancarte

5 Results

Training details de la pancarte + les results

6   Conclusion

Conclure sur notre méthode.

References

Hastie, T., Tibshirani, R., & Friedman, J. (2001). *The elements of statistical learning.* New York, NY, USA: Springer New York Inc.

Homayounfar, N., Fidler, S., & Urtasun, R. (2017). Sports field localization via deep structured models. In *2017 IEEE conference on computer vision and pattern recognition, CVPR 2017, honolulu, hi, usa, july 21-26, 2017* (pp. 4012–4020).