

Basketball players' recognition

Jeremy Ephrati (jephrati@stanford.edu)

Navid Moghadam (navidm@stanford.edu)

It is currently the NBA playoffs and most of the popular players are on the floor for long minutes to attempt to win a championship. We thought it could be interesting to apply the concepts we have learned from class and combine them with the sport we both like to follow. Our project will consist of recognizing as many NBA players on the floor as possible taken in a screen shot. Here is the strategy we will use:

We will be provided with the two teams that are facing each other. Each team has a home, away and alternate jersey. Based on the jersey colors of the two teams, we will first figure out which team is which by comparing the RGB colors of the jerseys with the data that we have for the home, away and alternate jerseys of the two teams. Using our reference paper on object's RGB color extraction, we will try to provide a range of RGB colors for every home, away and alternate jerseys and after taking the screen shot, see in which range the RGB colors of the teams' jerseys in the screen shot fall in and therefore recognize the two teams.

Then, our next step will be to recognize as many players on the floor as possible. Here we will try to recognize the number on the jersey to figure out who the player is. We will use similar strategies that we used in Homework 3 (with the crosswalk recognition problem) and in the reference paper about player number localization and recognition. We will do image segmentation using HSV thresholds and then remove the other areas until we get a clear vision of the number. Finally we will use the character recognition technique used in the license plate recognition paper: we will compare our number extracted with a database that we will create that will contain different sizes of the numbers (eg. 36x18). If a player's jersey has 2 digits, we will attempt to recognize the two digits separately and if the two digits are within a certain distance of each other, then the player's jersey will be a two-digit jersey. After recognizing the number, we will know the team the player is in and which number he is wearing, which is enough to tell us who that player is.

We will try to apply this technique to as many players as we can on the floor and hopefully recognize as many players as possible.

Reference papers:

- **Object's RGB color extraction**
Authors: Mohd Razali Bin Daud and Iqbal Zulkarnain Bin Abdulaziz
- **Player Number Localization and Recognition in Soccer Video using HSV Color Space and Internal Contours**
Authors: Matko Šaric, Hrvoje Dujmic, Vladan Papic and Nikola Rožic
- **Automatic Vehicle Identification by Plate Recognition**
Serkan Ozbay, and Ergun Ercelebi

Example:



In the above picture, we can see a screen shot of a game between the Los Angeles Lakers and the Detroit Pistons. The Lakers are wearing the dark blue jersey and the Pistons are wearing the white jersey. In the above picture, I put a red square where we can potentially recognize the player's number, and therefore the player. Clearly, some numbers will be a lot easier to recognize than others, i.e. number 2 and 24 from the Los Angeles Lakers team. This is why we will make our algorithm a best effort algorithm, where it will attempt to recognize as many players correctly as possible.