

## Assignment

### Scenario:

A basketball game comprises of players belonging to two teams and the referees. The two teams and the referees generally wear different colored uniform. One of the main goals in optical tracking is to localize each player in the court.

### Input:

A 3D point cloud is provided for a single frame, where every point corresponds to part of the objects above the ground (and some noise). The color of the point cloud corresponds to the surface color of the object.

### Coordinate System:

X, Z corresponds to the axes along the court, and Y is the axis perpendicular to the court.

### Objective:

Given the 3D point cloud, the objective is to locate the position (X, Z) of each person on the court. Along his position, each person must be assigned to one of the three possible classes: TeamA, TeamB or Referee.

### Sample Solution:

Your program must output a solution similar the following:

**TeamA:** [[2.3, 1.5], [23.4, 4.1], [11.1, 2.3]...]

**TeamB:** [[14.4, -11.0], [-21.4, 0.1], ...]

**Referee:** [[7.3, -1.5], [12.4, 23.4], ...]

A list of positions for all the players belonging to all the classes.

In addition, the code should be attached with explanation about the main functionality.

### Time Schedule:

You can submit the results, whenever you feel you are ready. We would appreciate it if it could be within one week. In case you need more time, please let us know.

**Input format:**

The input 3D point cloud is provided in a txt file.

Each line of the input file has 6 columns (X, Z, Y, R, G, B)

X, Z, Y: the *xzy* position of the 3d point

R, G, B: the *rgb* component of the color of the 3d point

For example:

```
21.3 -3.4 1.1 25 14 10
```

```
-1.3 14.4 2.7 255 11 5
```

The above file has 2 3d points:

1. Position: (21.3, -3.4, 1.1), Color: (25, 14, 10)
2. Position: (-1.3, 14.4, 2.7), Color: (255, 11, 5)