Project II: Scheduling the NBA

November 3, 2025

The National Basketball Association (NBA) is planning their schedule for the 2025/2026 season. In the attached games.csv you can find a (ficticious) preliminary schedule Among other data, you find, for each match, the home team, the away team, and the date and location of the match. The goal of the project is to possibly improve the current draft of the schedule, under some of the constraints imposed by the current schedule.

1 Instructions

The project is composed of 4 questions, all to be solved using Integer Programming, to be completed in this order:

1. Write codes that computes and prints, for each team i, the following information:
   (a) all the dates when team i played home;
   (b) for each team j, the number of times team i played against team j at home;
   (c) for each team j, the number of times team i played against team j away (i.e., at j's home);
   (d) all the dates when team j played away.
2. Write an Integer Program (without objective function) whose feasible solutions are all the feasible schedules, where a schedule is feasible if, for each team i:
   (e) i plays home (possibly, against a different team) exactly on the dates computed in (a) above;
   (f) plays away (possibly, against a different team) exactly on the dates computed in (d) above;
   (g) for each team j, i plays home against team j exactly the number of times computed in (b) above;
   (h) for each team j, i plays away against team j (i.e., at j's home) exactly the number of times computed in (c) above.

3. Compute a feasible schedule that satisfy the following additional constraint: no team should play three consecutive matches where the sum of the absolute values of the difference between the time zones of two consecutive matches is 4 or more; or conclude that no such schedule exists. For instance, if a team plays game 1,2,3 and:

   - the time zone difference between the arena where game 1 is played and the arena where game 2 is played is 2;
   - the time zone difference between the arena where game 2 is played and the arena where game 3 is played is 3;

   Then the schedule is infeasible, since $3+2 = 5 \geq 4$.

4. ***This part will not be graded, but we may ask you about it in the one-on-one discussion.*** Compute any improvement to the current schedule. For instance, using Google Maps, you could compute and store the locations of all arenas, compute a feasible schedule that minimizes the maximum distance traveled by a team, and compare this value with the one of the current schedule to show the improvement. You can also access the full 2023/2023 season schedule here.

2 Deliverables

1. pdf file explaining the models, including the variables, constraints, and the objective with their verbal explanations,

2. ipynb file containing all the code

3. schedules saved in a .csv or analagous file, presenting the list of matches organized as follows: (a) date (b) team playing home (c) team playing away (d)