

PROBLEM:

To define a set of python routines for automatically generate **ideal** defense roster for:

- Males
- Females
- Mixed gender with seniority

IMPLEMENTATION:

A complete defense roster will always consider the following positions:

LC, CB, CB, RB

Basic filters may be applied during preprocess, additionally defense line players are evaluated according to the following important skills:

1. overall
2. potential
3. defending
4. skill_long_passing
5. skill_ball_control
6. movement_reactions
7. movement_sprint_speed
8. mentality_interceptions
9. mentality_positioning
10. defending_marking_awareness
11. defending_standing_tackle
12. defending_sliding_tackle

To find the **ideal** roster, the following methodology is applied for each defense position.

1. Generate a top players ordered list according to the player multi-year average value for each important skill.
2. Define a **position_scoring** method related to the player's position for a given skill result list. Implemented scoring method is as shown in the example below for a top_players list of 4 members (being top_players a constant that can be chosen):

Ranking	Player name	Scoring
1	Name_1	4
2	Name_2	3
3	Name_3	2
4	Name_4	1

3. Obtain the **total skill position score** (tsps) summing up the player position scores on all important skill list for each player.
4. Obtain also, the **total skill value** (tsv) summing up the player average value on all important skill list for each player.
5. Sort players according to the **total skill position score** and take the top_players from this list as candidates for the ideal roster

Later, all candidates for each position are combined (cartesian product) to generate all possible defense rosters. Then, only rosters without repeated players are considered valid and the global **roster skills** value is calculated summing up the **total skill value** of each player in the roster and all valid rosters are sorted according to this global **roster skill** value.

Summarizing:

The ideal roster is the one providing the global maximum **total skill value** built up from those candidates that hold a better **total skill position score** in important skills rankings.

NOTE: a simple (reverse-ranking) **position_scoring** method has been chosen for this implementation, however other more complex methods such as:

- F1 point system {1:25, 2:18, 3:15, 4:12, 5:10, 6:8, 7:6, 8:4, 9:2, 10:1, *:0}
- Top 5 capped {1:25, 2:20, 3:15, 4:10, 5:5, *:0}

combined with specific definitions for each position and/or important skill could be applied and therefore different results may be obtained.

RESULTS

Male defense

Best male defense roster is ('D. Alaba', 'M. Hummels', 'Marquinhos', 'Carvajal') with a global **roster skill** value of 3453.2

Female defense

Best female defense roster is ('A. Majri', 'L. Oberdorf', 'J. Johnston', 'C. Dunn') with a global **roster skill** value of 3803.7

Senior defense

Best senior defense roster is ('Filipe Luís', 'M. Hummels', 'Piqué', 'P. Lahm') with a global **roster skill** value of 3712.9