International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

An Intelligent Method for Best Players to Help Build Sports Team

Namrata Pravin Kurade

M.E-II, Computer Engineering, PICT, Pune, India

Abstract: ***The best team selection is always the requirement of management in different domains and in different organizations including government, project, industry, business and sports. The traditional team selection process is really lengthy, awkward and unclear due to manual process and personal judgements, which may lead to a disaster. These convicting constraints and personal judgements can be translated into software for better and quick solution.***

Keywords: Team Formation, Player, Recommendation, Active Window Filtration, Sports

1. Introduction

Sports are all forms of customarily competitive physical thing which, through simple or organized participation, aim to utilize, maintain or ameliorate physical ability and skills while providing regalement to participants, and in some times, onlooker. Hundreds of sports subsist, from those needing only two participants, through to those with thousands of continuous participants, either in teams or competing as person. In organized sport, records of performance are often kept, which is auxiliary to track all the players.

In any game, player statistics has multiple parameters like number of matches played, total scores made, number of years played ,number of matches won/lost etc. It is paramount to identify all these statistical guidelines which reliably betoken player's performance and ameliorates the team cull process. The overall aim of my paper is to build a team of players with optimum multiple guidelines within budget and rule restriction. Rule tables has to be made as a data set where every restriction like presence of at least one player, overseas players in a team, health issues withal have to be taken in account.

A paramount step in developing efficacious teams is the cull of team members. A second approach is cull by team members. With this approach, ongoing team members evaluate players and choose new members. Our focal point is on this approach. Self-cull among groups and teams appears to be fairly prevalent. One indication of this is the incrementing utilization of self-managing team, which are, by definition, self-staffing. Despite the widespread use and prevalence of self-cull, not much is kenned about how self-cull happens especially, the characteristics that people perceive as consequential when culling incipient team members.

Cull of Players for sports within limited budget is involute task which can be viewed as held back multi goal optimization, multiple judging requirements, decision making quandary and constrained multi objective optimization. To solve this quandary we are proposing a system for providing an interactive sports game to a plurality of participants wherein each participant wishes to compose a sports team composed of authentic players for eight different games.

2. Literature Survey

Selection of Players for sports within finite budget is complex task which is a constrained multi objective optimization and multiple criteria decision making problem. The work on auto team formation and recommendation of team to players and vice versa is still not done.

M. Hano, D. Hamada, T. Sugawara proposed that Criteria and a better team can be selected by the systematic procedure [2]. Abstract factors like team coordination etc. can also be used for decision making process.

M. Gaston, M. desJardins developed model that provides a dynamic team formation environment where agent teams form spontaneously in a completely decentralized manner [3] and the agents decision making is based solely on local information.

B. Fenf, Z. Jiang, Z. Fan, N. Fu defined the formation of teams from a given set of players such that, when repeated many times, each player is equally often teammate [4] of each other player.

N. Mahmood found optimal solution for the problem of team selection on the basis of the previous outcomes which is Generic model [5] for multi-player games.

A. Anagnostopoulos [6] explored method where each teamcpossesses all skills required by the task and each team has small communication overhead.

Kashan presented a novel approach [7] where Player rating systems are based on performance statistics, which reflect situational factors of the game.

Z.Turkis, S. Dadelo, E.Zavadka presented a paper where they applied team formation method for multi-agent systems [8] consisting of self-interested agents in task-oriented domains where agents have no prior knowledge of the resources or abilities of the other agents.

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3. Mathematical Model

Our goal is to form effective teams, by considering the players performance in the task and modeling the effects among players in the team. We build upon the cognate research, and fixate on the following:

3.1 Team Formation

Team formation is concentrate on the difficulty of selecting the best subset of player in optimal way that can complete a task. In this section, we formally define the team formation quandary that models the effects of agents collaborating in a team, and give our team formation method to form an efficacious team for the task [3].

S is our system,

S = {I,O,D,NDD}

Where,
I = Input
O = Output
D = Deterministic data
NDD = Non deterministic data

I = {G, T,R}
O = {TF}
D = {Sk, Sa,R}
NDD = {W}

Where,
G=game
T= sub Type of game
R= Rules in Role tables
Sk=Skills
Sa=Special attributes for each skill

W= weight assigned to each special attribute

TF= Team Formation
1. Assign weights to the special attributes:

W{w1,w2,….,wn}→ Sa{sa1,sa2,….,san}

Every single attribute are given weights and at the end team is formed on this weights.

2. Using the available data, we then formulate the team selection problem as a multi-objective optimization problem, as follows:

t = argmax {c,w,p1,...,p9}

$$\begin{cases} f1(t) = \sum Batting\ Performance \\ f2(t) = \sum Bowling\ Performancce \\ f3(t) = \sum Fielding\ Performance \end{cases}$$

Notice that the wicket-keeper (w) does not affect the bowling performance of a team. The team is subject to the following constraints:

g1 (t) = c 2 Captain List,
g2 (t) = w 2 Wicket-keeper list,
g3 (t) = No two players are identical in a team,
g4 (t) =∑ Cost(i)<=Total Budget

Here, t represents a team comprising of c = captain = wicket keeper, (p1,…., p9)=nine players chosen from all players. The final constraint indicates that overall cost of the team must be within the specified upper limit.

3. An approach to designate a fair chance to the best candidates is mentioned in below equation.

Where,

$$\Pr(ki) = \frac{Skills\,(ki)}{\sum Skills\ (kj)}$$

Pr(ki) = Skill of current kth player
n = Total number or size of players
i = Number of currently available players
j = Number of all available players

4. If a tie occurs at some point during experiment, i.e., two or more players with same skills value gather in the mating pool, it will be resolved using skill values and experience values of players in tie or a Heuristic as
given below[5]:

ΔExperience = E(Pi) - E(Pj)

$$\partial = \frac{|\Delta f(P)|}{\Delta Experience}$$

Where,
E(Pi) = experience(skills) of ith player
E(Pj) = experience(skills) of jth player

Δf(P)= di_erence in skill value of current pair of player (having tie)

4. Final team is formed

∑R €∑T€∑S==P(R^∑Sa)

3.2 Recommendation of Team to players and vice versa

Recommender system is very important in today's life. It minimizes a lot of searching work when we find automated match. This thing I am trying to bring in sports. The main goal is to find best match of player to the team and best match of team to the player.

When Team is in short of player or when team is finding a player, recommender system will short list the best matched player to the team using its ranking and profile of player. Same is applicable when player needs team to play, my recommender system will suggests team based on profile.

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S = {Pr, Tr, Pp, Tp}

Where,
Pr=Player required
Tr=Team required
Pp= Player profile
Tp=Team profile

$$f(Tr) = \begin{cases} Tr \text{ and } (Tp == Pp) : Select \\ Otherwise, \quad : Reject \end{cases}$$

$$f(Pr) = \begin{cases} Pr \text{ and } (Pp == Tp) : Select \\ Otherwise, \quad : Reject \end{cases}$$

3.3 Active Window Filtration

In Active Window Filtration we are going to consider an extra parameter for the further of players. It reduces the task of searching players who are not active. Various parameters can be considered for this filtration. The parameter I am going to consider here is how many times player logs in, if the player is available on a particular day for the game(to play), whether player has recently played.

S is our System

S = {f,O,D,NDD}

Where,
I = Input
O = Output
D = Deterministic data
NDD = Non deterministic data

I = {P, L,A,R}
O = {AW}

Where,
P= Profile
L= Player logs in
A= Player available
R= player recently played
AW= Active Window

f(AW)=f{(P==A && P==R) | | L > α} Recommend Player

Where,
α = Average parameter considered for number of times user logs in

5. Results and Discussions

Fig, 1. Shows the pie chart for team formation before and after applying algorithm. We consider a system having 20 players. We focus on Cricket for simplicity. There are three levels of players- Professional players (7), Amateur Players (3), Casual Players (10). We get 12 random players from all levels. To refine our team formation, we apply our algorithm assigning weights to each level. The weights assigned here are Professional=1, Amateur=2, Casual=3. Hence when user forms a team, he gets 7 professional players, 3 Amateur Players and 2 Casual players.

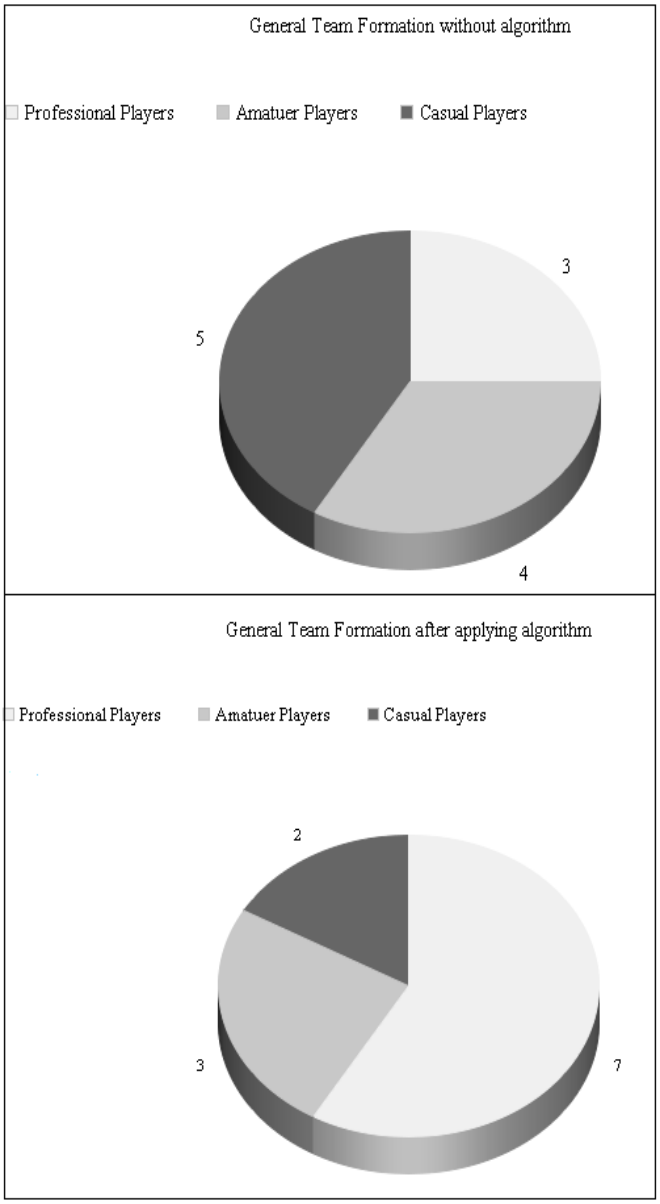


Figure 1: Pie chart for team formation before and after applying algorithm

Fig 2. Shows the availability of players before and after applying Active Window Filtration Algorithm We consider our system consists of 100 players. We get all the 100 players as output because algorithm is not applied. We further refine our algorithm by adding active window filtration. The players are categorized further according to their availability. Players play on weekend, weekday and any time. There are 45 players who play on weekend, 25 players who are available on weekday and 30 players who play any time. Now we further combine our results according to level of players and there availability.

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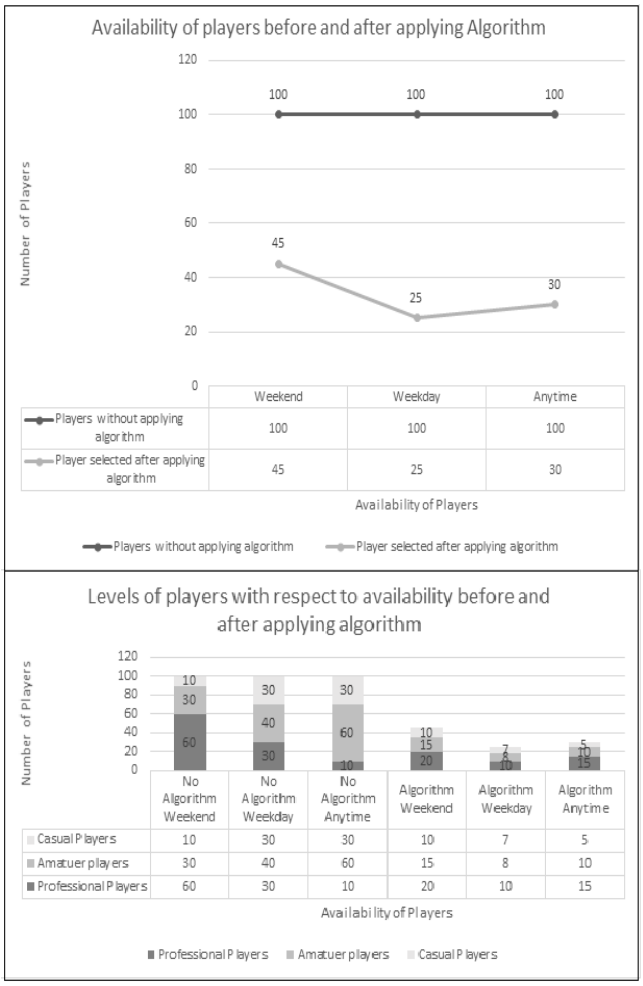


Figure 2: Line graph availability of players before and after applying Active window Filtration algorithm

6. Conclusion

In my work, I address the team formation problem with applications in various sports platform and propose a novel way to quantify and optimize a team's collective ability to solve a specific task. My work aims to evolve better teams using an evolutionary approach that optimizes the collective abilities of teams rather than the individual abilities of the team members.

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Author Profile



Namrata Kurade received the B.E degree in Computer Engineering from WIT, Solapur in 2013. I am pursuing M.E from PICT, Pune in computer Engineering.

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