Emotional Performance Factors Enabled Squad Rating Calculation For Adaptive Game-Playing Method

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Abstract. A game typically utilized as an equivalent for entertainment likewise fills in as an instructive device. Initially focusing on the enjoyment, the significance of the game has advanced to a lot more noteworthy ideas and their implementations. Games need either physical or mental stimulation or both at times. Numerous games help create practical abilities, fill in as a type of activity, or in any case play out an instructive, reenactment, or mental role. Being based on some specific key components, which are objectives, rules, goals, challenges, and interaction to replicate the links between the human client and the PC in a real scenario environment, many approaches and calculations, such as path-finding and option trees have been developed. Artificial intelligence (AI) is used in computer games to develop responsive, versatile, or sharp practices, primarily in non-player characters (NPCs) such as human-like understanding. This research makes an investigation, of how emotional performance strategies can provide a better playing experience and the effectiveness of each attribute.

Keywords: Emotional Intelligence, Gaming Algorithm, Emotional Gaming Attributes, Gaming Strategy, Emotional-Adaptive Games

I Introduction

Group rating is a quality assessment framework that permits you to think about various crews. It gauges how great, as far as anyone knows, a group can be. Having keen partners makes you a superior player and this is obvious in Every Team, which presents a couple of key components that settle on for better choices on the pitch.

Commonly, The "Team" Squad Rating may change from 0 (low) to 99 (best). Other than estimating the nature of the team by rating values, the "Team" Squad Rating additionally gives another overall rating: The Star Rating [1]. This estimation is based on each player's individual rating and the group's overall rating (all beginning eleven or more of the seven substitutes). It is somewhat abstract at that point because the player with the highest rating isn't always the best player.

The most demanding games like Soccer, or football computer game, is a progression of affiliation football computer games or football test system. It is a football test system
game played between humans or between humans and PC AI [2]. The AI is activated similarly to the player group to sustain consistency in the football crew among all 11 or more players, just as it is on the PC side.

Typically, for this type of game (Team Related), game developing members will use a few keys AI computations, such as A-Star search, deep learning methods, decision tree, and machine learning techniques too. It demonstrates how to pick different players into the appropriate position and how to strengthen passing by starting with one player and moving on to the next. The more substantial level structure is built by layering these fundamental talents [3]. Figure 1 shows the basic layered capabilities of the soccer game.

![Diagram showing the idea of layered capabilities](image-url)

**Fig. 1.** Diagram showing the idea of layered capabilities

A new innovation that comprehends three things:

- Foreseeing the future and what could occur at some random time during an assaulting play.
- Understanding when the dribbler is prepared to make a relaxed run accurately.
- Understanding and positioning assaulting space.

Nowadays, an increasing number of games contain an artificial intelligence engine. Such systems are based on real-world players and their playing behaviors, as well as game events and real-time playing experience. There isn't much research in this subject that mixes adaptive emotional feedback with game presenter characters, despite the fact that playing multiplayer games is also often regarded as a highly social activity (such as learning and teaching, entertainment, simulation). Game presenter characters can offer emotional factor-related input, which is used in real-time games to enhance
experience, to better energies players and pique audience interest [4]. A framework for creating artificial intelligence enabled emotional game avatars for tabletop multiplayer computer games that might give situational behavior and be tailored to player profiles and game progress in this way. In order to choose and deliver player-adapted and context-sensitive Emotional Performance Factors, this framework makes use of inputs like game events and player profiles (which contain information about a player's name, age, skill sets, attributes, etc.). It also keeps track of incoming information about game progress.

Here specifically suggests a game-playing approach with adaptive emotions through a variety of emotion states, each state tailored to and associated with the performance, advancement, and profile of each unique player [5]. The character passes through the associated emotional states while the game is being played and for the present player. In this manner, the total gaming experience can adopt a real-time playing behavior that improves it.

II Existing System
The Team Rating value is essentially the after effect of the normal between each of the 18 players' overalls in addition to rectification esteem. This revision esteem exists to offer different loads to the beginning 11, giving them more importance than the players or set of players who start on the bench [1].

To calculate the group rating, it is compulsory to know the ratings of the starting team squad and substitutes [It depends on the total number of players in a team, here it is considered as 11 initial squad and 7 substitutes, so total of 18 players]. As previously stated, the initial step is to compute the normal between the squad players' ratings. Simply add up each of these evaluations and divide the figure by 18 [6]. Every player’s whose individual rating is higher than the calculated average, adds significantly to the rectification factor and it with the difference falling somewhere between these two values. For the extra substitutes, this component is divided into two [7][8].

The Extended Cohn-Kanade Dataset (CK+) is one of the most recent datasets created for emotion recognition, with a considerable number of participants in comparison to previous datasets regularly used prior to 2010. They used a multiclass SVM with Active Appearance Model features to obtain baseline performance [9][10]. The confusion matrix's average across emotions shows an 83.3 percent accuracy, with no obvious weakness for any emotion. Many additional researchers have now evaluated their models on that dataset since its publication [11].

Many research have integrated self-report, neurophysiological activity, and behavioural responses to analyse emotions during game play. Some research used just physiological tonic measures, or the mean of physiological reaction over a given time period, to calculate overall emotional response [12][13]. Examining the various emotional
components and phasic physiological reactions to specific video game events, on the other hand, can be extremely beneficial, because there is generally a dynamic flow of events and activities throughout games that reflect the actual world. Many neurophysiological instruments and methodologies, as well as the analysis of expressive behaviours, could be useful tools for capturing reactions to phasic, fast, and instantaneous occurrences during gaming [14].

The significance of emotions in computers is hotly debated. Emotion theorists disagree on whether the model should be discrete or dimensional [15]. "Discretionists" contend that basic discrete emotions like anger, fear, sadness, and happiness are distinct experiencing states. The "dimensionalists" view emotions as a two-dimensional space comprised of valence ("pleasantness") and arousal ("activation"). As a third dimension, dominance is sometimes introduced.

III Proposed Method

A. Individual Player Ratings

The accuracy and perfection of the team are based on the squad ratings and it is facilitated using the player potential index. Each player has a different way of gaming and they are not unique in real games. Based on the real-time observation, each player was assigned a potential index value by analysing different gaming aspects. According to the skill set of players, the potential index is assigned. And one important factor is if suppose both players have the same potential index; it doesn’t mean that they are similar tactics players [4][5]. The Individual Rating of a player is depending upon many criteria and attributes of their carrier and individual performance of the field. For a Player-X, he/she can be dominated in some of the playing skills but may not performed well in other criterial skills.

To calculate the overall potential of a player needs to consider different attributes associated with a player. For individual skill sets, each player has different values. These are the common attributes, which are considered for potential calculation [7]. Table 1 shows various attributes for potential calculation.

<table>
<thead>
<tr>
<th>P_crossing</th>
<th>P_reactions</th>
<th>P_marking</th>
<th>P_RS</th>
<th>P_RCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>P_finishing</td>
<td>P_balance</td>
<td>P_standing_tackle</td>
<td>P_LW</td>
<td>P_RM</td>
</tr>
<tr>
<td>P_heading_accuracy</td>
<td>P_shot_power</td>
<td>P_sliding_tackle</td>
<td>P_LF</td>
<td>P_LWB</td>
</tr>
<tr>
<td>P_short_passing</td>
<td>P_jumping</td>
<td>P_GK_diving</td>
<td>P_CF</td>
<td>P_LDM</td>
</tr>
<tr>
<td>P_volleys</td>
<td>P_stamina</td>
<td>P_GK_handling</td>
<td>P_RF</td>
<td>P_CDM</td>
</tr>
<tr>
<td>P_dribbling</td>
<td>P_strength</td>
<td>P_GK_kicking</td>
<td>P_RW</td>
<td>P_RDM</td>
</tr>
<tr>
<td>P_curve</td>
<td>P_long_shots</td>
<td>P_GK_positioning</td>
<td>P_LAM</td>
<td>P_RWB</td>
</tr>
<tr>
<td>P_freekick_accuracy</td>
<td>P_aggression</td>
<td>P_GK_reflexes</td>
<td>P_CAM</td>
<td>P_LB</td>
</tr>
</tbody>
</table>
By analyzing these different skill sets, a potential index is assigned to different players. For each player, the index value for particular skill sets may vary. Figure 3 shows sample skill sets of some players. Figure 2 shows different attribute values for players.

Fig. 2. Sample skill sets of different players

The overall Squad Rating will directly depend on the individual player ratings. If all the players having good individual ratings resulting on excellent Squad Rating. Specially in a team different player playing different roles in the team, so excellent squad ratings resemble team having excellent players in each role. Figure 3 shows various potentials of different players in the recent decade.

Fig. 3. Overall ratings and potential of different real-time players
B. Squad Rating Calculation

Squad Rating calculation is the essential step in overall process to identify the strength of a squad or team. It involves the individual strength and weakness of the player behavior towards the game playing scenario.

This is the overall equation used to figure the Squad Rating:

\[
SR(Squad\,\,Rating) = \frac{\text{[Individual Rating's Sum] + [CF]}}{\text{Total No. of Players}}
\]

Where,
- \(SR\) - Squad Rating
- \(SUM\) - Rating’s Sum of all the players
- \(CF\) - Correction Factor

While Calculating Squad Rating, the term Correction Factor will adjust the individual values against final team/squad rating.

This is the overall equation used to figure the Correction Factor:

\[
[CF] = \frac{[R1]-[AvgR]}{2} + \frac{[R2]-[AvgR]}{2} + \ldots + \frac{[R11]-[AvgR]}{2} + \frac{[R12]-[AvgR]}{2} + \ldots + \frac{[IRn]-[AvgR]}{2}
\]

Where,
- \(CF\) - Correction Factor
- \(AvgR\) - Average Rating of the players (not rounded)
- \(Rn\) - Individual Rating of the player number \(n\)

Recall that, players with appraisals greater than the \(AvgR\) can be utilized to ascertain the value for Correction Factor.

Step1- Sum the potential evaluations of all players;

Step2- Divide by no. of players to get the normal for a player (don't adjust it);

Step3- For each individual player over the normal value by the amount they were over the normal and finally summarize this (don't adjust it);

Step4- Aggregate the certain value that you found in the past and advance to the one you obtained in step number 1;
Step 5 – Make round the figure to the closest digit and separate it by number of players;

Step 6 – Round the value to get the last team rating by the equation.

C. **Squad Rating illustration without Emotional Performance Factors:**
To make the calculation simpler, we will look to an illustration of a team without substitutes, much the same as it occurs on Squad Building Challenges.

The beginning eleven's appraisals are: 76, 83, 81, 84, 81, 77, 78, 84, 83, 79 and 78.

Algorithm: Squad Rating

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SUM THE INDIVIDUAL POTENTIALS</td>
</tr>
<tr>
<td></td>
<td>This is incredibly simple. Include every one of these numbers together</td>
</tr>
<tr>
<td></td>
<td>Result: 884.</td>
</tr>
<tr>
<td>2</td>
<td>CALCULATE THE AVERAGE BY PLAYER</td>
</tr>
<tr>
<td></td>
<td>Separation it by eleven, at that point, Result: 80.36.</td>
</tr>
<tr>
<td>3</td>
<td>IDENTIFY THE FACTOR CF</td>
</tr>
<tr>
<td></td>
<td>The revision factor rises to the distinction between every player's appraising and the normal you got at stage 2. At the point when a player's appraising is equivalent to or below the normal.</td>
</tr>
<tr>
<td></td>
<td>Accordingly,</td>
</tr>
<tr>
<td></td>
<td>( CF = [(83-80.36)] + [81-80.36] + [84-80.36] + [81-80.36] + [84-80.36] + [83-80.36] = 13.84. )</td>
</tr>
<tr>
<td>4</td>
<td>ADD THE FACTOR CF</td>
</tr>
<tr>
<td></td>
<td>At that point, you include the qualities acquired at stages 1 and 3:</td>
</tr>
<tr>
<td></td>
<td>( {884} + {13.84} = 897.84 )</td>
</tr>
<tr>
<td>5</td>
<td>ROUND IT AND DIVIDE BY No. of Players</td>
</tr>
<tr>
<td></td>
<td>At that point, you partition 898 by 11: Result: ( {898/11} = 81.63. )</td>
</tr>
<tr>
<td>6</td>
<td>ROUND THE VALUE</td>
</tr>
<tr>
<td></td>
<td>81.63 will round to 82. That is the last team crew rating.</td>
</tr>
</tbody>
</table>

D. **Emotional Performance Factors:**
All these datasets are assigned by observing player performance on fields. But it is not handling any mental game skills or strategies, all are based on real physical skill sets. But in a real game, mental gaming or skills plays an important role. It may change the complete result of the game. Some players show extra performance when a team on a defeat position. Some payers may show additional courage to face a difficult situation. All these changes are based on the player’s mentality and current situation. So here introducing other parameters or attributes which facilitate the mental game strategy of players [16][17]. Table 2 shows emotional performance attributes.

**Table 2.** Emotional Performance Attributes to calculate player potential
Emotional Performance Attributes

Key performance at defeat condition (KPDC)
- Showing courage at a difficult game stand (SCDG)
- Performance on Provoking/Sledging (PPS)
- Pressure Handling Ability (PHA)
- Team Chemistry Factor (TCF)

Some players show extra performance when the team at defeat condition or someone provokes them, same time some players lose their confidence and maybe tensed in a defeat situation. If a player is tensed or loses hope of winning will reduce the playing quality. Another one who may show extra talent in a difficult situation will contribute more to a team. Here considering these attributes also for different players. Each attribute varies from -3 to 3. Negative values show, that players are lacking in these attributes, and positive values show extra performance factors on these attributes. Figure 4 shows various emotional performance values of players.

<table>
<thead>
<tr>
<th>Player</th>
<th>Potential</th>
<th>KPDC</th>
<th>SCDG</th>
<th>PPS</th>
<th>PHA</th>
<th>TCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Player-1</td>
<td>83</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Player-2</td>
<td>82</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Player-3</td>
<td>81</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Player-4</td>
<td>80</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Player-5</td>
<td>75</td>
<td>-1</td>
<td>-1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Player-6</td>
<td>82</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>Player-7</td>
<td>80</td>
<td>0</td>
<td>-1</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Player-8</td>
<td>76</td>
<td>-2</td>
<td>-2</td>
<td>-3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Player-9</td>
<td>77</td>
<td>-2</td>
<td>-1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Player-10</td>
<td>78</td>
<td>-1</td>
<td>-3</td>
<td>-2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Player-11</td>
<td>78</td>
<td>0</td>
<td>0</td>
<td>-1</td>
<td>-1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Fig. 4.** Emotional Intelligence Attributes

Find out the average of emotional factor (EF_AVG) attributes and add with the existing potential of each player to find out the Emotional effective potential (EF_Potential) of players. Figure 5 shows the effective potential of players by calculating Emotional Performance Factors.
E. Squad Rating with Emotional Performance Factors:

By using the emotional effective potential of each player, squad ratings can be calculated:

\[
SR(Squad\ Rating) = \frac{[\text{Individual Rating's Sum}] + [\text{CF}]}{\text{Total No. of Players}} + \text{EPF}
\]

Where,

- SR - Squad Rating
- SUM - Rating’s Sum of all the players
- CF - Correction Factor
- EPF – Emotional Performance Factor

The beginning eleven's potentials are: 83, 82, 81, 80, 75, 82, 80, 76, 77, 78 and 78.

After calculating emotional factors, potentials are [Fig. 5]: 86, 84, 82, 81, 75, 83, 80, 73, 76, 76, 77
Stage 4 – ADD THE CF
At that point, you include the qualities acquired at stages 1 and 3: 873 + 19.84 = 892.84

Stage 5 – ROUND AND DIVIDE WITH TOTAL PLAYERS
At that point, you partition 893 by 11: 893/11 = 81.18.

Stage 6 – CALCULATE EMOTIONAL PERFORMANCE COEFFICIENT
Consider all non-zero EF_AVG values, sum it and divided by number of non-zero values
Here, (3+2+1+1+1-3-1-2-1)/9 = 0.12

Stage 7 – ADD EP COEFFICIENT WITH SQUAD RATING
Add the emotional factor with potential, 81.18 + 0.12 = 81.30

Stage 8 – ROUND THE RATING TO NEARBY INTIGER
81.30 - > 81. That is the last crew rating.

The Game-Playing experience will directly depend on how the players are behaving/playing in computer gaming like real world situation and the way of adaptation. The Emotional Performance Factors can adapt real time scenarios in games like different potential playing attitude towards the game based on the current situation.

IV Result Analysis
After putting emotional performance factors into a team playing, the overall playing experience is enhanced and teams may perform well in a difficult situation [18]. Figure 6 shows the difference between potentials before and after adding emotional performance factors.

<table>
<thead>
<tr>
<th>Player</th>
<th>Potential</th>
<th>Squad Rating</th>
<th>EF_Potential</th>
<th>Squad Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Player-1</td>
<td>83</td>
<td></td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>Player-2</td>
<td>82</td>
<td></td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>Player-3</td>
<td>81</td>
<td></td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>Player-4</td>
<td>80</td>
<td>80</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td>Player-5</td>
<td>75</td>
<td></td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Player-6</td>
<td>82</td>
<td></td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>Player-7</td>
<td>80</td>
<td></td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Player-8</td>
<td>76</td>
<td></td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Player-9</td>
<td>77</td>
<td></td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>Player-10</td>
<td>78</td>
<td></td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>Player-11</td>
<td>78</td>
<td></td>
<td>77</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 6. Squad rating before and after adding EM_Potential values.

Adding emotional performance factors may affect overall squad ratings and it will increase the performance of a player in a difficult situation if he has the ability or else
the player gets tensed. It will enhance the overall game-playing experience. Figure 7 shows the Histogram of the player's overall ratings.

Analyzing the overall performance of available players before and after adding the emotional performance factor [19], shows an amazing change in real-time playing strategy.

![Histogram for players Overall Rating](image)

**Fig. 7.** Overall rating of players without EP factors

After adding emotional performance factors, the overall team potential is changed drastically. It will improve the real-time game-playing experience. Figure 8 shows the Histogram of the player's potential after adding EP potential values [14].

![Histogram for players Potential](image)

**Fig. 8.** Overall potential values of players with EP factors.

Each player's performance enhancement over emotional performance factor also affects team squad ratings and final squad values. Figure 9 shows box plots over player potential and squad ratings [20].
Fig. 9. Squad ratings vs player potential

By adding all EP potentials, most of the skill sets of a player and team rating has enhanced. But if most of the players of a team get tensed or lose confidence in a difficult situation may lead to a decrease in the team ratings. Figure 10 shows a scatter plot between player potential and squad ratings.

Fig. 10. Scatter plot of Squad ratings vs player potential

V Conclusion
The proposed strategy analyzes various AI methods utilized in gaming platforms, for example, Algorithms utilizing AI gaming evaluations and squad ratings. On account of rating calculation-driven AI games, the calculation is utilized by the general appraisals. The perception produced using the calculation-based procedure was that the calculation-based strategies required unmistakable space information to be powerful and furthermore, the bigger the game creates, the calculation was discovered to be a lot
of viable also. In squad rating strategies, found that the data sources contemplated, chose the yields subsequently causing the determination of contributions to be exact and obtain to get the normal outcomes. The effective performance of the games, on the other hand, grew and became substantially more engaging. The Squad Rating won’t ever be mediocre compared to the basic normal between all the 18 players' appraisals on the grounds that the rectification factor is consistently positive;

- The beginning players' evaluations gauge excellent in comparison to the Team Rating;
- As the difference between team ratings grows, so does the amendment factor.
- The Squad Rating doesn't rely upon the reserves;
- The Team Rating slightly relies upon the player's emotional performance and team’s potential;
- The Team/squad Rating won't change if the player value is customary or IF they have potential and similar rating;
- If you add a superior player or players to your crew, your overall group rating will not diminish.
- Emotional Performance parameters provide an impact on team ratings

VI References

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