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Multitask Multi attention Residual Shrinkage Convolutional Neural Network Personalized Assessment Model of Tennis Teaching Based on Data Mining and Intelligent Recommendation

Abstract: - Tennis is highly explosive, continuous, intense sport that involves numerous continuous short-term explosive actions. This type of training is short-term, high-intensity, and focuses on competitive skills. Athletes must be physically fit and have long-term endurance to excel in technical and tactical skills during competition. In this manuscript, Multitask Multi attention Residual Shrinkage Convolutional Neural Network Personalized Assessment Model of Tennis Teaching Based on Data Mining and Intelligent Recommendation (MMARSCNN-PAM-TT-DM-IR) is proposed. The input data are collected from training levels of technical – sportive actions of 12-14 years old tennis players' dataset. Initially the input data is preprocessed using Generalized Multi-kernel Maximum Correntropy Kalman Filter for exploring the data. The pre-processed data is given into Gradient Descent Namib Beetle Optimization (GDNBO) for choosing features from the dataset. Then, selected features are given to Dual Tree Complex Discrete Wavelet Transform to extract gray-scale statistical features such as Homogeneity, Entropy, Energy and Smoothness. Finally, the extracted feature attributes are given to MMARSCNN is used to Tennis Teaching Based on Data Mining. In general, MMARSCNN does not express some adaption of optimization strategies for determining optimal parameters to assure accurate Teaching of Tennis. Therefore, Zebra Optimization Algorithm (ZOA) is proposed to enhance weight parameter of MMARSCNN, which precisely Teaching of tennis depend on Data Mining. The proposed model is implemented, its efficacy is assessed utilizing some performance metrics such as accuracy, precision, F1-score, MSE, AUC. The proposed MMARSCNN-PAM-TT-DM-IR method provides 22.55%, 24.72% and 29.63% higher accuracy; 32.66%, 34.97% and 29.57% higher precision; 25.18%, 21.52% and 28.68% higher F1-Score is compared with existing method such as analysis characteristics of Tennis singles matches depend on 5G with data mining technology (AOC-TSM-DM), Tennis online teaching information platform depend on android mobile intelligent terminal (AMIT-TTP-DM), optimization analysis of Tennis players' physical fitness index depend on data mining with mobile computing (OA-TP-DM-MC) respectively.

Keywords: Dual Tree Complex Discrete Wavelet Transform, Generalized Multi-kernel Maximum Correntropy Kalman Filter, Gradient Descent Namib Beetle Optimization, Multi attention Residual Shrinkage Convolutional Neural Network, Zebra Optimization Algorithm.

I. INTRODUCTION

People's production, lives are changing the world. Running big data tasks on mobile platforms has become more common in current years, thanks to growing mobile devices, increasing computing power of mobile processors [1].Running big data applications on mobile platforms enables inventers to rapidly utilize novel big data processes to mobile platforms, allowing people to access big data services at any time, from any location, refining productivity, quality of life, stimulating industrial renovation [2-4].Chinese tennis began late on international stage, so relative level is lower, development rate is slow; primary causes for this tennis's lack of popularity [5]. Numerous athletes are slow to get involved in tennis, miss out on fast-growing fitness period, impedes tennis growth later [6].New tennis players are hope, strength for sport's future in our country. They begin by basic knowledge and progress gradually. There plenty of top tennis players. As a result, tennis training for young people is a top precedence, country is starting to take notice [7, 8]. This has allowed for more in-depth youth tennis training, as well as the winning of numerous struggles, opportunities for young tennis players [9].Yang developed volleyball fitness method depend on data mining, analyzed five major components of volleyball players using mathematical statistics, generated volleyball typical indicators depend on five fitness traits [10]. Depend on adaptability of several indicators, weight coefficient of healthy athlete, which represents weight index of physical index, can be calculated by dividing quality factor, characteristic value of rotated index by total characteristic value of several factors. Weighting factor utilized to generate a physical fitness method of volleyball players using data mining [11-14]. This model can effectively assess a health status, competition, and athlete's training. The assessment technique is utilized to test planned volleyball player health assessment method, outcomes display that method is dependable. But investigational data is too little, not sufficiently considerable [15]. Yulin utilized bibliographic data techniques, mathematical statistical approaches, DT prediction methods to conduct statistical exploration data of 198 unemployed women from four areas [16].

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According to investigation, standard decision tree forecast method has accuracy higher, novel DT method is possible [17]. A woman's chances of winning tennis match are primarily determined by her percentage of receiving, scoring. Finding is technology sending, receiving serves as link among present tennis technology, key factors influencing game outcomes [18]. Women who play tennis now focus on efficacy, avoid making unnecessary mistakes. The primary goals are increase winning rate of women's tennis matches, offer suitable counter measures, recommendations for assessing quantitative indicators of tennis match winners, attains exact tennis training execution techniques [19].

A. Problem statement and Motivation

One of the weaknesses is that it uses data from the Tennis League's current technical statistics database. Due to their relative stativity, these data points might not give a complete picture of the athletes' or club's total technical skill. Furthermore, a portion of the data is vulnerable to the statistician's subjective assessment, which could introduce bias and create situations devoid of objectivity. These problems could lead to biased or insufficient analysis results. Such are motivated to do us this investigation work.

In this paper, features of big data jobs on mobile processors, investigation purpose is to monitor events related to the micro architecture of mobile processors while they are operating big data tasks. Data mining, MMARSCNN will be employed to analyze the event values. The ultimate objective is to develop abilities of mobile processors by analyzing performance features of big data are collected from the dataset. Combining event values from every monitoring, utilizing each monitoring's event data to the fullest extent possible is known as merging. Structured data requires cleaning and one-to-one correspondence between feature names and the original data collecting and monitoring as features system performance.

B. Contribution

Major contribution of this research work is arranged as below,

- In this section, MMARSCNN-PAM-TT-DM-IR is proposed.
- In the proposed method introduces MMARSCNN, a performance data mining framework for mobile processors. It utilizes hardware counters with iteratively employs MMARSCNN process to create performance method. The method ranks significance of micro architecture events in big data tasks, decreases big data dimension to Zebra Optimization Algorithm based on the performance characteristics described.

In this paper is arranged as below: section 2, present literature review. Section 3, present proposed method. Section 4 shows result with discussions. Section 5, conclusion.

II. LITERATURE REVIEW

Among frequent investigation works on deep learning depend Tennis Teaching; some of the latest investigations were assessed in this part.

Li et al., [20] have presented AoC of TSM depend on 5G-DM Technology. In the presented method degree to which a tennis player makes tactical and technical decisions affects the game's outcome significantly. Priorities include how to overcome the drawbacks of conventional statistical methods, identify features, laws of game from vast amount of technical with tactical data, and offer a scientific foundation for sound decision-making. Artificial statistical techniques are also employed to introduce errors and subjective participation. It provides high accuracy and low precision.

Wang [21] have presented Tennis online teaching information platform depend on AMIT. In presented method analyzes, enhances functional with nonfunctional necessities of tennis online teaching information platform as well as necessities of students for mobile learning. It does this by using Android system framework, software architecture to design technical features of platform. This was done for design considerations other technology of online teaching information platform. It provides high precision and low F1- score.

Zhang and Mao [22] have presented OA of TP physical fitness index depend on DM-MC. In the presented method mobile processor presentation DM framework called Mobile PerfMiner ranks significance of micro architecture events of big data task, decreases presentation big data dimension, and builds a performance model iteratively using the XGBoost algorithm. This allows the big data algorithm to be optimized based on the performance characteristics described. The final load reflects sports technology. It provides high F1- score and high mean squared error.

Peng and Kim, [23] have presented psychological training technique for table Tennis players utilizing DL. In the presented method Rich plate content is present in the facial recognition-based heart rate monitoring approach. With the use of DL face recognition, heart rate measurement technique can measure changes in an athlete's heart rate at real time, effectively remove impact of other external environmental factors, and monitor for visible AI auxiliary diagnosis. Intends to offer practical advice for table tennis players' psychological conditioning, utilizing DL as the technical backbone. It provides high AUC and low precision.

Li and Luo [24] have presented design of teaching quality analysis with management scheme for PE courses depend on DM process. In the presented method create DM-depend analysis with management scheme for the quality of instruction in PE courses. It also discusses how to apply data mining and information technology to PE by combining real-world classroom instruction, ultimate purpose of creating DM-depend PE performance management scheme that will support and enhance in-person PE instruction. It provides low mean squared error and low AUC.

Kang [25] have presented construction of selection with evaluation process for higher-level Tennis students in colleges with universities depend on random matrix method. The presented method enhancing selection, training of elite tennis students is significantly impacted by the technique used to evaluate the abilities of these kids. The model creates an ability evaluation index scheme for elite tennis players in colleges, universities by selecting professional technical, knowledge learning, complete improvement, maintainable improvement ability as weighting factors based on literature, expert opinions. It provides high AUC and lowF1-score.

Cheng [26] have presented the result of multimedia-aided sport education method on teaching tennis lessons in colleges with universities. In presented method network multimedia-assisted teaching was becoming more prevalent. Here, examines how multimedia-assisted sports education affects tennis teaching in colleges, universities. Initial step includes analyzing relevant fields, features of network multimedia CAI. The TLBO process analyses "teaching", "learning" phases of tennis teaching, revealing flaws. It attains high precision, low specificity.

III. PROPOSED METHODOLOGY

In this section, MMARSCNN Personalized Assessment Model of Tennis Teaching Based on Data Mining and Intelligent Recommendation is proposed. The block diagram of proposed MMARSCNN-PAM-TT-DM-IR approach is represented in Figure 1. This process consists of six steps likes data acquisition, pre-processing, feature selection, feature extraction, classification, optimization. Accordingly, full explanation of all step given as below,

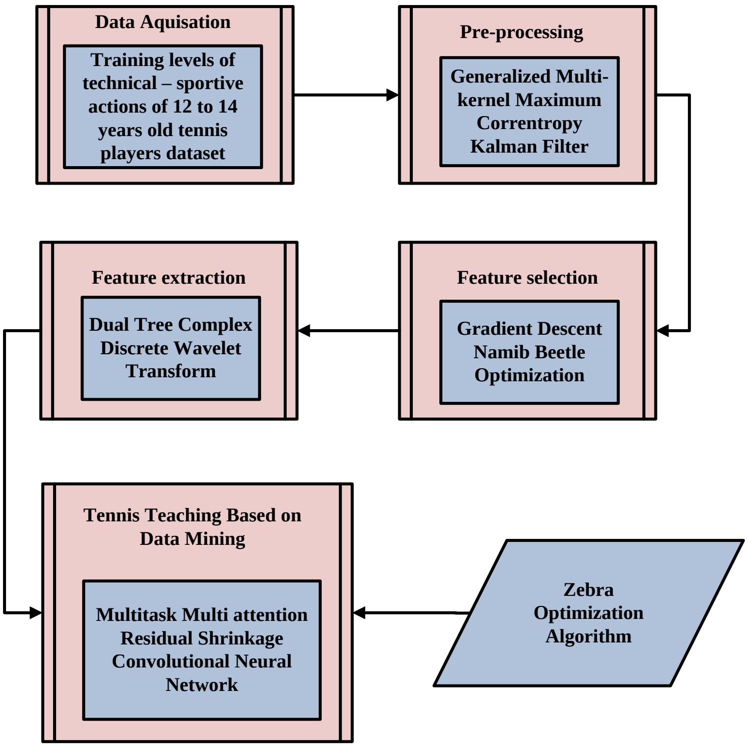

Figure 1: Block Diagram for MMARSCNN-PAM-TT-DM-IR method

A. Data acquisition

The data is gathered from training levels of technical – sportive actions of 12-14 years old tennis players' dataset [27] that includes tennis teaching. Relate average frequency of practice for three tennis play initiatives (serve, serve return, baseline game), dual kinds of strokes (preparation, definition strokes). Therefore, "Inventário do Treino Técnico-Desportivo do Tenista - 12" was applied to sample of 37 male tennis players ("under 14" category) challenging international tennis tournament. A paired sample t-test used compare altered types of stroke. There were important differences ($p < 0.05$) between explored playing initiatives, stroke kinds. Finding could designate early specialty of technical-sportive activities between Brazilian junior tennis players. The 23 Features are present in training levels of technical – sportive activities of 12-14 years old tennis players' dataset. Then, gathered data are fed to pre-processing.

B. Pre-processing using Generalized Multi-kernel Maximum Correntropy Kalman Filter

In this step, data pre-processing using GMKMCKF [28] is discussed. The GMKMCKF is used to exploring the data. GMKMCKF can be used in a presence of specific frequency components affects data quality. Filters can change their characteristics in response to changes in the quality of data. It may be used in the context of data to remove, interference, or unwanted frequency components from the input data. It is recognised that frequency adaptation is crucial GMKMCKF to acquire exact tracking outcomes .Then the quality of data is given in equation (1),

$$y_{h+1} + X_h = B_{Y_H} + \gamma_h \tag{1}$$

where y_{h+1} represents the saved data, X_h represents the redundancy in the data, B_{Y_H} explore the data γ_h represents the number of saved data. Then the quality of exploring data is calculated in equation (2).

$$q_h^r = Bq_{h-1}^+ A' + P_h \tag{2}$$

where q_h^r represent quality of data, Bq_{h-1}^+ is the quality of accurate analysis, P_h is the parameter value of data. Then the mathematical calculation of explored datais formulated in equation (3),

$$y_h^+ = y_h^= + H_h(y_h - Cy_h^= \tag{3}$$

where y_h^+ is represents the number of saved data. , H_h is the higher value of data, Cy is the explore data analysis. Finally, GMKMCKF method explored the data. Then, pre-processed data given into feature section.

C. feature selection using Gradient Descent Namib Beetle Optimization (GDNBO)

In this stage, the Gradient Descent Namib Beetle Optimization (GDNBO [29] is proposed for selection of features. It proposes a two-step method and a data analytics-based framework for tennis teaching system. GDNBO help identify relevant features for intrusion detection. Framework includes data detection, preparation, scheduling, construction, assessment components to implement data analytics lifecycle and tennis teaching in data mining. The best First value is calculated using the following equation (4).

$$E_b = E_{\min} * \cos\left(\frac{\rho(U_b)_- \rho_{\max}}{\rho_{\min} - \rho_{\max}} * \frac{\lambda}{2}\right) \tag{4}$$

where E_b denotes the feature of data, $E_{\min}$ is the minimum data value, ρ is the parameter value in data, U_b is the data mining, $\rho_{\max}$ denotes maximum parameter value, $\rho_{\min}$ signifies minimum parameter value, $\frac{\lambda}{2}$ denotes calculation in feature value. Then the modular feature values are calculated in equation (5).

$$\sigma_{b.a} = \|U_b - U_a\| = \sqrt{\sum_{j=1}^{A} (U_{b,t} - U_{a,t})^2} \tag{5}$$

where $\sigma_{b.a}$ denotes the modular features values, U_b is the data mining, U_a is the recognition of data mining, $\sum_{j=1}^{A}$ is the initial feature value calculation, $U_{b,t}$ is the time detection of data mining, $U_{a,t}$ is the time recognition of data mining. To account for issue boundary condition, number of particles in swarm, from the above equation the features are selected by GDNBO, Among 23 features 7 features are selected from training levels of technical – sportive activities of 12-14 years old tennis players' dataset.

D. Feature extraction using Dual Tree Complex Discrete Wavelet Transform

In this step, DTCDWT [30] to extract the gray-scale statistical features such as Homogeneity, Entropy, Energy and Smoothness. The DTCDWT is data processing method that divides the data into frequency components at various scales. While all potential normal functions are taken into account during decomposition in continuous wavelet transform, they are sampled individually in discrete wavelet transform (DWT). It is given in equation (6),

$$g(r) = \sum_{h,d} p_{h,d} w_{h,d}(r), \tag{6}$$

where, $g(r)$ represents the linear input features of basic function, $p_{h,d}$ represents the set of weighting features, d represents the dilation parameter, h represents the scaling factor of the features and $w_{h,d}(r)$ represents set of basic functions, these functions are attained from modification of scaling function β , mother wavelet function. High pass filter (f) is given in equation (7),

$$x_{high}[m] = \sum_{d=-\partial}^{\partial} y[d] f[2m-d] \tag{7}$$

where, $y[d]$ represents input features, is the high filter and represents the $f[2m-d]$ represents the weight of the extracted features. To enhance the feature extraction even more, this decomposition is performed again. The features such as Homogeneity, Entropy, Energy and Smoothness were extracted. The homogeneity of a value distribution in a data is measured. It can be calculated using a formula that takes into account the proximity of each pixel intensity value to the data mean intensity. The quality of being homogeneous is referred to as homogeneity. Then the formula for calculating homogeneity is given by the Equation (8),

$$\text{Homogeneity} = \sum_{\text{i,j}} \frac{p(i,j)}{1+|i-j|} \tag{8}$$

where $p(i,j)$ represents pixel value of data, $i-j$ is the calculation of value in data. Entropy quantifies the uncertainty of an data pixel intensities. It is calculated using the pixel value histogram. Then the formula for calculating Entropy is given by the Equation (9).

$$entropy = \sum_{a,b}^{n} p_{i,j} \log(p_{i,j}) \tag{9}$$

where $p(i,j)$ signifies pixel value of data. Magnitude of the pixel values in a data is represented by energy. Then energy sum of the pixel point in a data and it is given by the Equation (10).

$$energy = \sum\sum p(i,j)^2 \tag{10}$$

where $\sum\sum p(i,j)$ denotes pixel value of data in energy. Then the formula for calculating Smoothness is given by the Equation (11).

$$smoothness = 1 - \frac{1}{1+m^2} \tag{11}$$

where m is the smoothness of images, Finally, DTCDWT is extracted the features such as Homogeneity, Entropy, Energy and Smoothness. After completing feature extraction, extracted features are fed to MMARSCNN.

E. Tennis Teaching Based on Data Mining using Multitask Multi-Attention Residual Shrinkage Convolutional Neural Network

In this section, MMARSCNN [31] model is proposed for the Tennis Teaching Based on Data Mining. MMARSCNN is used to training of tennis in data mining. MMARSCNN appears to be designed for distinguishing between data, especially in tennis training. Then analyze the data is calculation in equation (12).

$$W(G_W) = \frac{1}{s} \sum_{j=1}^{s} G_W(j) \tag{12}$$

where $W(G_W)$ denotes analyze the data weight, $\frac{1}{s}$ is the calculation of time, $\sum_{j=1}^{s}$ is the initial time value calculation, $G_W(j)$ is the designed data value. Then the tennis teaching is calculated in equation (13).

$$N_w = (M_1^{Vm*(\kappa)}(M_2^{Vm*(\kappa)}W(G_W) + D_1 + D_2 \tag{13}$$

where N_w signifies number of calculation weight, M denotes minimum of data, D is the tennis teaching, κ is the sigmoid function, $M_1^{Vm*(\kappa)}$ is the minimum of data to sigmoid function first value, $M_2^{Vm*(\kappa)}$ is the minimum of data to sigmoid function second value, D_1 is the tennis teaching of first value, D_2 is the tennis teaching of second value. Then the data mining function is calculated in equation (14).

$$\xi_w = \beta_m M^*(G_w) \tag{14}$$

where ξ_w denotes the data mining of function, β_m is the main value of data function, M^* is the multiple value, $M^*(G_w)$ is the multiple value of data mining. Finally, MMARSCNN is used for Tennis Teaching Based on Data Mining. In this work, ZOA is employed to enhance MMARSCNN. Here, ZOA is employed for tuning weight, bias parameter of MMARSCNN.

F. Optimization using Zebra Optimization Algorithm (ZOA)

In this section, ZOA [32] process is utilized to enhance the weight parameter of MMARSCNN. ZOA used to optimize MMARSCNN weight parameters which effectively Tennis Teaching Based on Data Mining. The optimized weight parameters obtained through the ZOA driven optimization process are then applied within the MMARSCNN model to improve Tennis Teaching Based on Data Mining performance. The ZOA algorithm principle can be divided into five major stages, which are includes in given steps.

Step 1: Initialization

Initialize population of Zebra optimization. The values for the decision factors are based on where each zebra is located in the search space. A matrix can be used to mathematically model the zebra population is shown in the equation (15),

$$M = \begin{bmatrix} m_{11} & m_{12} & \dots & m_{1n} \\ m_{21} & m_{22} & \dots & m_{2n} \\ \dots & \dots & \dots & \dots \\ m_{j1} & m_{j2} & \dots & m_{jn} \end{bmatrix} \tag{15}$$

where, m denotes zebra population, j *and* n signifies number of population.

Step 2: Random generation

Input parameters produced at randomly. Ideal fitness values were chosen depend on obvious hyper parameter condition.

Step 3: Fitness function estimation

A random solution is made using initialized evaluations. Using parameter optimization value, fitness function is evaluated for enhancing weight parameter N_w, ξ_w of the classifier. It is given in equation (16),

$$Fitness function = optimizing\ N_w, \xi_w \tag{16}$$

Step 4: Foraging behaviour

The ZOAs foraging process is discussed in this section. Based on simulations of zebra behaviour when looking for feed, population members are updated. In light of this, quantitatively represent updating zebra positions during the foraging phase are shown in the equation (17),

$$M_h = \begin{cases} M_h^{new,q1}, & P_h^{new,q1} < P_h \\ M_h, & else, \end{cases} \tag{17}$$

where, $M_h^{new,q1}$ represents novel status of h^{th} zebra depend on first phase, $m_{h,b}^{new,q1}$ is b^{th} dimension value, P_h denotes new objective function value, QS signifies pioneer zebra that is best member, QS_b is h^{th} dimension, f denotes random number.

Step 5: Defense Strategies against Predators N_w, ξ_w

The location of ZOA population members is updated at search space using simulations of zebra's defense mechanism against teaching by using the mode the strategy of zebra is shown in mathematical model in equation (18).

$$m_{h,b}^{new,q2} = \begin{cases} D_1 : m_{h,b} + A.(2f-1).\left(1-\frac{k}{K}\right).m_{h,b}, & Q_D \leq 0.5 \\ D_2 : m_{h,b} + N_w f.(WL_b - O.m_{h,b}), & else, \end{cases} \tag{18}$$

where, $M_h^{new,q2}$ denotes novel status of h^{th} zebra depend on second phase, $m_{h,b}^{new,q2}$ is its b^{th} dimension value, k denotes iteration contour, K signifies maximum iteration, A denotes constant number, Q_D signifies probability of selecting one of two approaches which generated randomly, f is a random number. It is shown in equation (19),

$$M_h = \begin{cases} M_h^{new,q2}, & P_h^{new,q2} < P_h \\ \xi_w & else, \end{cases} \tag{19}$$

where, $P_h^{new,q2}$ is the objective function and $M_h^{new,q2}$ denotes novel status of h^{th} zebra depend on second phase. Figure 2 shows Flowchart of ZOA for optimizing MMARSCNN parameter.

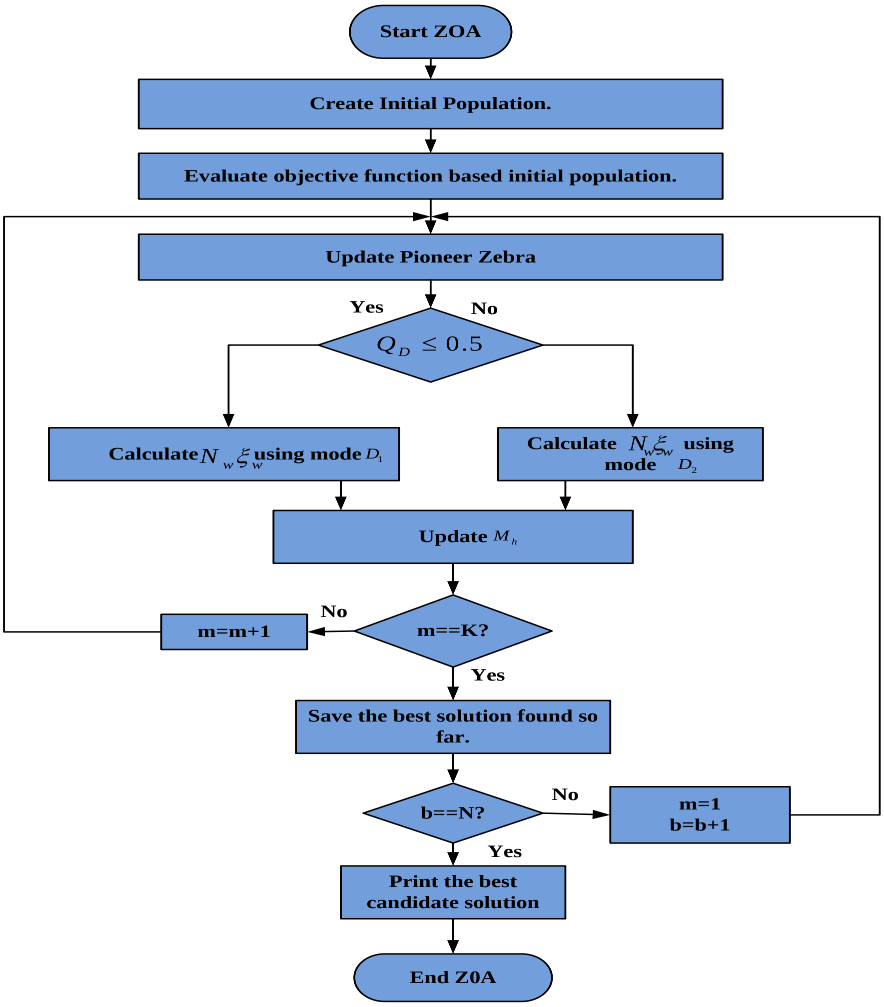

Figure 2: Flowchart of ZOA for optimizing MMARSCNN parameter

Step 6: Termination Condition

Finally, the factor N_w, ξ_w is optimized by ZOA; will repeat step 3 till it reaches halting criteria $m = m + 1$.MMARSCNN is optimized with ZOA effectively for detection review with better accuracy. Thus the proposed MMARSCNN-PAM-TT-DM-IR method effectively analyzes Tennis Teaching with higher accuracy and lower Mean Squared Error.

IV. RESULT WITH DISCUSSION

The simulation outcomes of MMARSCNN-PAM-TT-DM-IR are discussed. The proposed technique is executed in python. The performance of proposed technique analyzed with existing such as AOC-TSM-DM, AMIT-TTP-DM and OA-TP-DM-MC.

A. Performance Metrics

This is evaluated to measure proposed technique efficiency. It is an important task for better classifier selection. To study performance, performance metrics likes accuracy, precision, F1-score, MSE, AUC are studied.

1) Accuracy

The Accuracy is a metric used to evaluate a detection system's performance in correctly identifying and classifying instances within a given dataset, categorized as tennis teaching. Then the calculation of Accuracy is given in equation (20).

$$Accuracy = \frac{(TP + TN)}{(TP + FP + TN + FN)} \tag{20}$$

where, TP denotes true positive, TN refers true negative, FP denotes false positive, FN refers false negative.

2) Precision

Precision measures the system's ability to classify positive cases correctly out of each predicted positive cases. It is proportion of true positives to total false positives, true positives, which is given in equation (21),

$$\Pr ecision = \frac{TP}{(TP + FP)} \tag{21}$$

3) F1-score

It refers harmonic mean of precision, sensitivity. It is widely utilized as evaluation metric in binary, multi-class classification, combines precision, sensitivity into single metric to gain best understanding of method performance. It is given in equation (22).

$$F1 - score = \frac{TP}{TP + FN} \tag{22}$$

4) AUC

The AUC curve compares true positive rate to false positive rate at different threshold settings. AUC-ROC measures method’s ability to distinguish between classes, with higher values indicating better performance. This is computed by equation (23).

$$ROC = 0.5 \times \left(\frac{TP}{TP + FN} + \frac{TN}{TN + TP} \right) \tag{23}$$

B. Performance analysis

Figure 3 to 7 depicts simulation result of accuracy, precision, F1-score, MSE, AUC are analyzed for MMARSCNN-PAM-TT-DM-IR technique is analyzed with existing technique likes AOC-TSM-DM, AMIT-TTP-DM and OA-TP-DM-MC respectively.

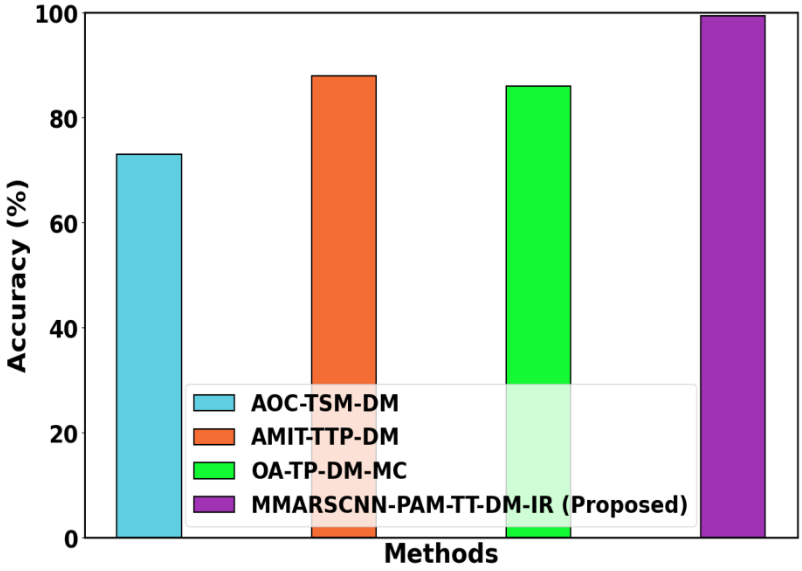

Figure 3: Accuracy analysis

Figure 3 depicts accuracy analysis. The MMARSCNN-PAM-TT-DM-IR method provides the 22.55%, 24.72% and 29.63% higher accuracy analyzed with existing method likes AOC-TSM-DM, AMIT-TTP-DM and OA-TP-DM-MC respectively.

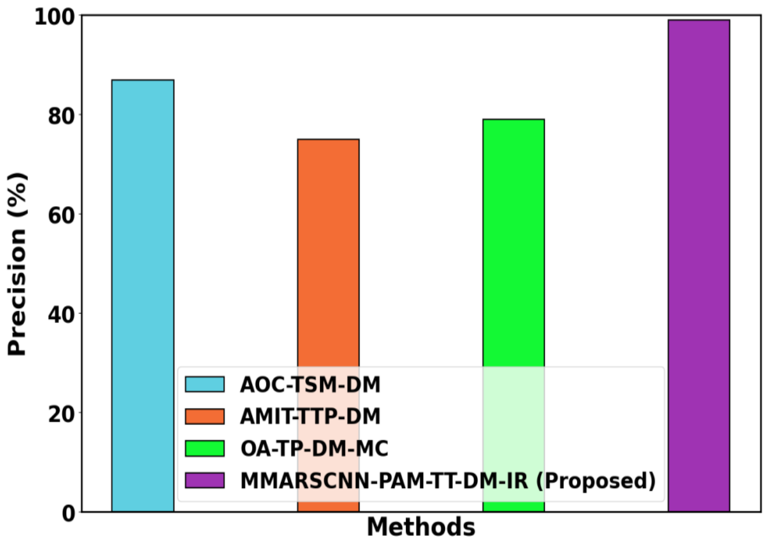

Figure 4: Precision analysis

Figure 4 depicts precision analysis. The MMARSCNN-PAM-TT-DM-IR method provides 32.66%, 34.97% and 29.57% higher precision is analyzed with existing technique likes AOC-TSM-DM, AMIT-TTP-DM and OA-TP-DM-MC respectively.

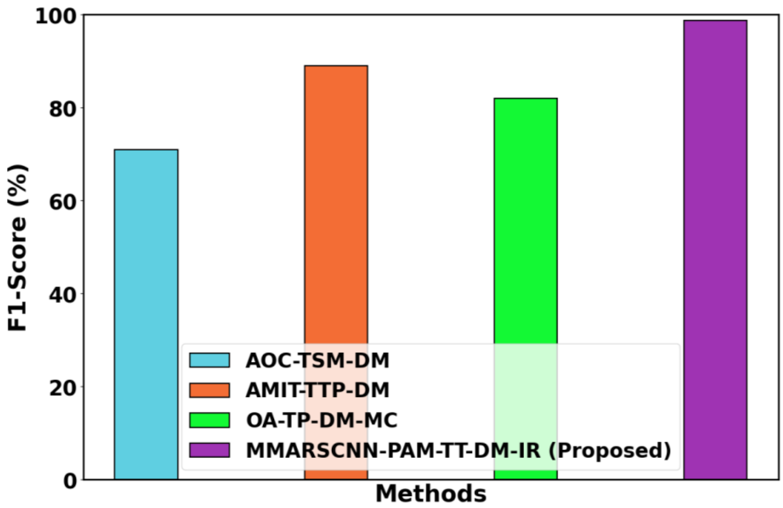

Figure 5: F1-score analysis

Figure 5 depicts F1-score analysis. The MMARSCNN-PAM-TT-DM-IR method provides the 25.18%, 21.52% and 28.68% higher F1-score is analyzed with existing technique likes AOC-TSM-DM, AMIT-TTP-DM and OA-TP-DM-MC respectively.

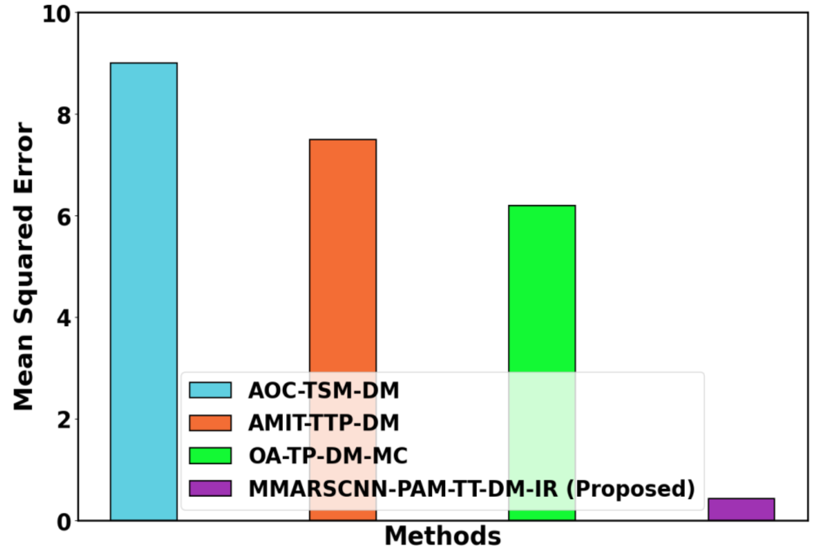

Figure 6: MSE analysis

Figure 6 depicts MSE analysis. The MMARSCNN-PAM-TT-DM-IR method provides achieves an improvement of 29.88%, 36.65%, and 19.78% lower mean squared error analyzed with existing technique likes AOC-TSM-DM, AMIT-TTP-DM and OA-TP-DM-MC respectively.

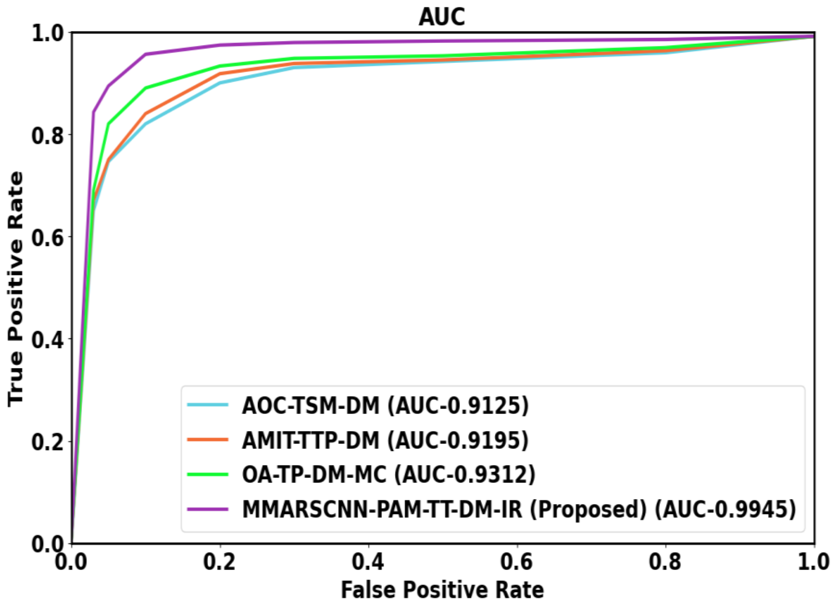

Figure 7: AUC analysis

Figure 7 shows AUC analysis. The MMARSCNN-PAM-TT-DM-IR method achieves improvements of 0.98%, 0.92%, and 0.94% higher AUC when analyzed with existing techniques likes AOC-TSM-DM, AMIT-TTP-DM and OA-TP-DM-MC respectively.

C. Discussion

The various MMARSCNN models are trained and tested using Tennis Teaching Based on Data Mining and Intelligent Recommendation. During the experiment, changed the hyper parameters that shape the MMARSCNN Change a single parameter and the others will be fixed. The Tennis Teaching Based on Data Mining and Intelligent Recommendation accuracy of MMARSCNN-PAM-TT-DM-IR is 22.55%, 24.72% and 29.63% higher than existing methods such as AOC-TSM-DM, AMIT-TTP-DM and OA-TP-DM-MC respectively. Similar to this, the precision of proposed method is 96.94% analyzed with sensitivity of comparison techniques of 82.54%. Therefore, the comparative methods are expensive than the proposed technique. As a result, the proposed technique classifies Violation Intelligent Recognition effectively and efficiently.

V. CONCLUSION

In the manuscript, Multitask Multi attention Residual Shrinkage Convolutional Neural Network Personalized Assessment Model of Tennis Teaching Based on Data Mining and Intelligent Recommendation (MMARSCNN-PAM-TT-DM-IR) has successfully implemented. The proposed method describes the Tennis Teaching Based on Data Mining. The proposed MMARSCNN-PAM-TT-DM-IR method is implemented in python. The performance metrics such as accuracy, precision, F1-score,MSE, AUC are evaluated. The MMARSCNN-TT-DM-ZOA method provides 29.88%, 36.65%, and 19.78% lower Mean Squared Error; 0.98%, 0.92%, and 0.94% higher AUC is compared with existing method such as AOC-TSM-DM, AMIT-TTP-DM and OA-TP-DM-MC methods respectively.

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