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Optimized Hamiltonian Deep Neural Network-Based Art Education Teaching Content and Evaluation System

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Abstract: - The organized educational processes and experiences created to promote a comprehension and appreciation of the visual arts are referred to as art education. It includes a variety of exercises designed to foster artistic abilities, the ability to express oneself creatively, and a greater understanding of artistic ideas and background. There are several places where art instruction can take place, such as private studios, museums, community centers, and schools. In this manuscript, Optimized Hamiltonian Deep Neural Network-Based Art Education Teaching Content and Evaluation System (HDNN-AETC-ES) is proposed. Initially the data is collect from MADS dataset. To execute this, input data is pre-processed using Adaptive Distorted Gaussian Matched Filter (ADGMF) and it removes the noise from collected data. Then, data is fed to Hamiltonian Deep Neural Network (HDNN)for effectively categorized Technology-Based Art Teaching Platform. Generally, HDNN doesn't express adapting optimization approaches to determine optimal parameters to ensure accurate art teaching. Hence, the Tasmanian Devil Optimization Algorithm (TDOA) to optimize Hamiltonian Deep Neural Network which accurately evaluated the art teaching. Then the proposed HDNN-AETC-ES is implemented and the performance metrics likes accuracy, precision, recall, F1-score, computation time, ROC are analyzed. Performance of the HDNN-AETC-ES approach attains 18.41%, 24.08% and 32.57% higher accuracy, 20.31%, 21.08% and 22.57% higher Precision and 21.41%, 22.08% and 23.55% higher recall when analyzed through existing techniques like art education teaching content using optimization of digital art teaching platform depend on information technology with deep learning (DAT-IT-DL), building arts education policy utilizing tools of out-of-school time youth arts organizations (BAEP-ST-YAO) and investigating arts education effects on school engagement with climate (IAE-ES-EC) methods respectively.

Keywords: Adaptive Distorted Gaussian Matched Filter, Art Education, Evaluation System, Hamiltonian Deep Neural Network, Tasmanian devil Optimization Algorithm.

I. INTRODUCTION

China's teaching, education have significantly enhanced against backdrop of recent curriculum reform, which is directly tied to the advancement of information technology (IT) [1-3]. Technology is continuously being used in education and training to maximize instruction in the classroom and increase its effectiveness [4]. Thus, digital teaching platform is gradually replacing traditional teaching mode to assist schools conduct further effective education, teaching [5]. The study art teaching instruction has getting better recently. According to technology advancement has completely transformed every aspect of society in recent decades, including educational resources and practices [6]. Instructors were acquiring the art teaching skills necessary to embrace information and communication technology and were adjusting to it; this process needs to be on-going [7]. They suggested that creating art teaching materials was an essential way to keep up with the trend of Internet+ education, teaching reform [8]. It can facilitate creation, dissemination of excellent instructional materials and encourage the all-encompassing use of IT in teaching reform and delivery [9, 10]. Additionally, it was a crucial assurance for bolstering the development of art teaching instructional materials and networking instructing. In the requested that IT is used in education on a constant basis to enhance the calibre of instruction in recent years [11]. In practical teaching, the flipped classroom model and art teaching resource database were widely used, and some outcomes were seen [12]. It showed the potential benefits of utilizing novel online psychometric tools for students' psychological counselling, opening up fresh possibilities for digital art teaching platform to help students' psychological needs [13-15]. The investigation outcomes of DL demonising auto encoders were enhanced through the application of machine learning algorithms, which also provided references for data processing, stability, security of digital art education platforms [16]. Lastly, even though industrial hazardous gas tracking process suggested by has some relevance to topic of art education platform, findings of the parallel optimization framework, energy usage reduction research provide particular references for platform's optimization, on-going development [17]. The research mentioned above, which covered techniques and technologies from numerous industries, produced significant improvements and optimizations for this platform [18]. These findings will serve as an essential resource for creating the suggested platform and raising the standard of instruction.

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A new approach to teaching in schools has been made possible by the successful establishment of the art teaching education platform model through the use of IT. Moreover, the art teaching platform provides a strong foundation for future teaching optimization since it has a thorough understanding of the everyday learning environments and instructional strategies used in schools [19]. This study purpose to establish, continuously develop art teaching platform depend on IoT, DL in quick improvement of IT, upgrade teaching quality of school, inspiration of students' learning through teaching mode of art teaching platform [20]. The study successfully integrates DL and IoT, presents novel technical approaches for field of education, enhances suggested platform, raises standards for classroom instruction. The real-time statistics gives educators a resource to help them create more successful teaching tactics and provides schools with scientific data to support their understanding of students' learning status.

A. Problem statement and Motivation behind this Research work

The application of Art teaching education is advancement of information technology has a substantial impact on conventional teaching methods, necessitating on-going modifications to the current learning environment. First, it is used to study DL computing techniques and the modelling art education platform. Secondly, art teaching platform looks into then evaluates daily learning status of students as well as the teaching strategies used in schools [21-27].

In this, study highlights the challenges faced by students in making the most out of art teaching platforms, offering a fresh viewpoint on how to enhance education. To put it briefly, this study is crucial to improving both the advancement of school teaching standards and the art teaching platform. It has made a significant contribution to the growth and advancement of the field of education.

B. Contribution.

The major contribution of this paper includes,

- This approach involves using Optimized Hamiltonian Deep Neural Network-Based Art Education Teaching Content and Evaluation System.
- A pre-processing helps to the noise is removed by using adaptive distorted Gaussian matching filter for the MADS dataset.
- By fusing the recommended techniques with artistic practice, students can experiment with novel media, technologies, forms of expression to make further creative, unique works in field of art teaching.

Remaining manuscript is organized as below: part 2 presents literature review, part 3 describes proposed method, part 4 proves outcome and discussion, part 5 conclusion.

II. METHODOLOGY

Numerous investigation works were previously suggested based on Art Education Teaching Content and Evaluation System. A few works are reviewed here,

Liu and Ko [21] have presented The Optimization of DAT Platform depend on IT with DL. Here, discussed better teaching techniques hopes to raise the standard of instruction at the school on a daily basis. First, information technology (IT) is used to study deep learning (DL) and the Internet of Things (IoT) in great detail. Subsequently, the research model was developed by analysing the calculation approaches that rely on IoT-DL. Findings indicate students are taking lead in the regular teaching process. This method provides higher accuracy but it provides lower f1 score.

Halverson et al. [22] have presented BAEP utilizing tools of out-of-school time YAO. Here, discussed educational systems and their stakeholders, the past few years have been particularly turbulent due to the emergence of COVID-19 and the increased public consciousness of racial inequality. However, academics who question established theories of responsibility and education have contended that these crises also present chances for significant transformation. This method provides higher recall but it provides lower accuracy.

Bowen and Kisida [23] have presented IAE effects on school engagement with climate. In this study discussed a renewed emphasis on the components of well-rounded education along with rise in interest in more general measures of academic achievement, such as social and emotional growth and involvement in the classroom. Finding instructional strategies that enhance these results has proven difficult, though. Through the use of administrative, survey data from Boston's public schools, they investigate the impact of arts instruction on wide range of educational results. This method provides higher f1- score but it provides lower recall.

Hua et al. [24] have presented application of SVM method depend on ML in art teaching. Here, discussed evaluation's goals are to consider whether education offers students a supportive environment and opportunities for growth, as well as the impact of instruction and the usefulness of the skills developed via teaching to society. Many positive outcomes have been attained in the development of art education when it comes to evaluation, such as the enhancement of art education overall, the growth of artistic talent, and an increased significance for the social and educational communities that are concerned with the quality of art education. This method provides higher recall but it provides lower f1 score.

Bu [25] have presented Construction of Process Method in AI Interactive Art Teaching Evaluation Scheme from Perspective of Core Literacy. In the process of nurturing and enhancing students' overall quality and ability, students' moral, intelligent, physical, artistic, labour abilities are all developed more comprehensively. Teaching art was a crucial component of both basic education and core literacy education, developing core literacy was process that takes time and effort. The goal was to change unique teaching mode, improvement teaching conception, cultivate higher-quality all-around talents. It provides higher f1- score but it provides lower precision.

Zhou and Zhan [26] have presented innovative design of art teaching quality evaluation scheme depend on big data with association rule process from perspective of maintainable improvement. Here, discussed even now, there are still many issues with online art classes, including low course production, little room for maintainable use, growth, high degree of course resemblance. Data mining efficiently extracted indicators of institutions of higher art education teaching quality evaluation scheme utilizing association rule process. This method provides higher accuracy but it provides lower precision.

Wu [27] have presented investigation on improvement of art education with teaching depend on background of big data. Here, a log-MMSE estimator was used to improve the multiband spectral subtraction approach for voice amplitude spectral enhancement. The experiments demonstrate that the algorithm was capable of successfully reducing both the distortion issue with the art teacher's dialogue speech and the classic spectral subtraction. Also, compared to the conventional spectral subtraction approach, the improved dialogue speech signal created by the improved multi-band spectral subtraction in this article can extract more time-domain aspects of the speech signal. This method provides higher accuracy but it provides lower ROC.

III. PROPOSED METHODOLOGY

In this proposed methodology, HDNN-AETC-ES is discussed for identifying Art Education Teaching Content and Evaluation System. The model endures initial data is gathering by accurately identifying the presence, location, and characteristics further processing. These phases endure major two processes likes preprocessing, and Art Education Teaching Content succeeding sectors. Block diagram of HDNN-AETC-ESis represented by Figure 1.

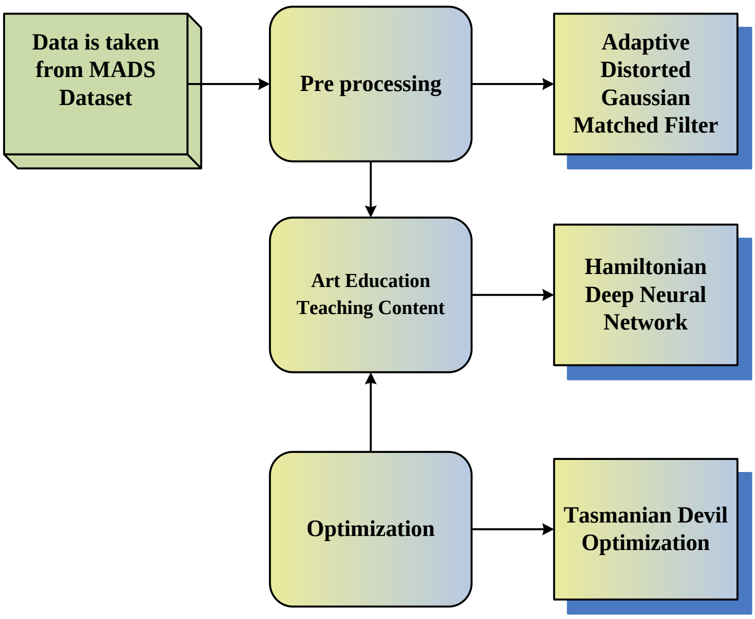

Figure 1: Block Diagram for Proposed HDNN-AETC-ES Method

A. Data acquisition

In this section, data are collected from MADS dataset [28]. This data kinds provide basic structure for working with the MADS model's orthogonal dimensions. The MADS model's ability to extend the application of the theoretical modelling methodology to operational use of database and provide a corresponding conceptual query, data manipulation language is a key feature that helps it achieve its objective of relieving users of implementation worries.

B. Pre-processing utilizing Adaptive distorted Gaussian matched filter

The ADGMF [29] method is utilized which utilized to remove noise from collected input data. It comes to art education, the pre-processing method of ADGMF entails using advanced signal processing techniques to improve the aural representations of artworks, historical artefacts, or creative creations. To enhance the clarity, fidelity, and perceived quality of data's, audio recordings, or other sensory data pertinent to artistic study and appreciation, ADGMF combines matched filtering principles. To guarantee comparable displacements throughout a neighbourhood, two-dimensional Gaussian filter by standard deviation of β, $G(\beta)$ is convolved by said fields and scale factor α is utilized to attain initial displacement fields. Thus it is given in equation (1) and (2)

$$\Delta x = \alpha.\left(Rand_x(m,n) * G(\beta)\right) \tag{1}$$

Here, Δx is denotes horizontal direction; $Rand_x$ is denotes the uniform distribution at interval [-1, 1]; $G(\beta)$ is denotes similar displacements around a neighbourhood; $*$ signifies operand of discrete teaching; m defines measurement of the direction and n denotes number of evaluating system.

$$\Delta y = \alpha.\left(Rand_y(m,n) * G(\beta)\right) \tag{2}$$

here, Δy is denotes the vertical direction; $Rand_y$ is denotes the uniform distribution at interval [-1, 1]; $G(\beta)$ is denotes similar displacements around a neighbourhood; $*$ is denotes the operand of evaluation; m is defined as measurement of the direction and n is defined as the number of the evaluating system. Elastic deformation is utilized to original adaptive filter in order to model this curvature. Thus it is given in equation (3)

$$k(u,v) = k\left(x + \Delta x(x,y), y + \Delta y(x,y)\right) \tag{3}$$

here, (u,v) is defined as the art education system; $\Delta x(x,y)\, and\, \Delta y(x,y)$ is represented by displacement component and k is denotes the adaptive filter. ADGMF can be used to enhance details, removing noise, and increase overall visual quality in data of artwork, paintings, or historical documents. Thus it is given in equation (4)

$$F(x,\{W_i\}) = H(x) - x \tag{4}$$

here, F is denotes the evaluating system of art teaching; x is defined as input teaching phase; W_i is denotes the weight of the i^{th} layer and $H(x)$ is represented by desired education to learn. To assist schools in conducting more efficient instruction and learning, digital learning platforms are gradually replacing traditional teaching methods. After, the method is correspondingly removing the noise using equation (5)

$$H(x) = F(x,\{W_i\}) + x \tag{5}$$

here, $H(x)$ is represented by higher education system to learn; F is denoted as the functions of evaluating education system; x is denotes the input feature of education content and W_i denoted as the weight of the i^{th} layer.Finally, the noise is removed from the collected dataset. Then the pre-processed data are fed toHamiltonian Deep Neural Networks.

C. Art Education Teaching Content using Hamiltonian Deep Neural Networks

In this section, Art Education Teaching Content using Hamiltonian Deep Neural Networks(HDNN) [30] is discussed. In disappearing and expanding gradients during the back propagation, training Hamiltonian Deep Neural Networks (HDNNs) can be challenging. In order to tackle this issue, a broad category of Hamiltonian DNNs originate from discretization of Hamiltonian systems in continuous time. This class encompasses several HDNN architectures that are already in use and are based on ordinary differential equations. They required the embedded system model of first order nonlinear dynamical system. Thus it is given in equation (6)

$$\dot{x}(t) = f\left(x(t), \theta(t)\right), \qquad 0 \le t \le T \tag{6}$$

here, $\dot{x}(t)$ represents first order nonlinear dynamical system; $x(t)$ is represented by $x(t) \in \Re^{n}$ for first compute value; $\theta(t)$ is represented by $\theta(t) \in \Re^{n0}$ is a vector of parameter and f is represented the function of the education system. The sample period, utilize resulting discrete time equation for network layer. Thus it is given in equation (7)

$$x_{j+1} = x_j + hf(x_j, \theta_j), \qquad j = 0,1,...., N-1. \tag{7}$$

here, x_j *and* x_{j+1} defines the input, output of layer j; h is represented the sample period of education system model; f is represented the function of the education system and θ_j is represented the distributing forward propagation. The NN system is stimulated by time varying Hamiltonian model. Thus it is given in equation (8)

$$\dot{x}(t) = J(t)\frac{\partial H(x(t),t)}{\partial x(t)} \tag{8}$$

here, $\dot{x}(t)$ represents first order nonlinear dynamical system; $x(t)$ is represented by $x(t) \in \Re^{n}$ for embedded value; ∂H is represented the Hamiltonian function; $J(t)$ is represented the continuously differentiable function and t time period of the evaluation system. The value of the Hamiltonian function is discretization independently and effectively. Thus it is given in equation (9)

$$H(x(t),t) = [\sigma(K(t)x(t) + b(t))]^{\mathrm{T}} \tag{9}$$

here, H is represented the Hamiltonian function; $x(t)$ is represented by $x(t) \in \Re^{n}$ for embedded value; t time period of the evaluation system σ is defined as the differentiable map; K is defined as the activation function and $b(t)$ is defined as stationary point of the evaluation system. Art teaching is enhancing the creation and dissemination of excellent educational materials and encourage their all-encompassing use. Then, the Art Educational Teaching content is given in equation (10)

$$|\sigma'(x)| \leq S \tag{10}$$

here, $\sigma'(x)$ is denotes the sub derivative of the activation function and S is defined as common activation function.Finally, HDNN accurately evaluated the Art Education Teaching Content.Because, theart teaching platform and the development of educational standards. Here, TDOA is employed to optimize the HDNN, for tuning weight, bias parameter of HDNN.

D. Optimization using Tasmanian Devil Optimization Algorithm

The proposed TDOA is used to improve weights parameters $x(t)$ of proposed HDNN [31].The Tasmanian devil is marsupial, carnivorous wild animal inhabits island state of Tasmania. It is member of Dasyuridae family. The Tasmanian devil feeds itself in two ways. The first tactic, a Tasmanian devil will eat carrion if it comes across any. It uses its second tactic to attack its target in order to hunt and eat on it.

1) Stepwise Procedure for TDOA

Here, step by step procedure for obtaining appropriate HDNN values using TDOA is described here. To creates uniformly distributed population for optimizing ideal HDNN parameters. Entire step method is then presented in below,

Step 1: Initialization

Initial population of TDOA is, initially generated by randomness. Then the initialization is derived in equation (11).

$$Y = \begin{bmatrix} y_{1,1} & \cdots & y_{1,j} & \cdots & y_{1,m} \\ \vdots & \ddots & \vdots & \iddots & \vdots \\ y_{i,1} & \cdots & y_{i,j} & \cdots & y_{i,m} \\ \vdots & \iddots & \vdots & \cdots & \vdots \\ y_{N,1} & \cdots & y_{N,j} & \cdots & y_{N,m} \end{bmatrix}_{N \times m} \tag{11}$$

here, Y denotes population of Tasmanian devils; y_i defined as i^{th} candidate solution; $y_{i,j}$ defines candidate value of j^{th} variable; N defined as number of searching Tasmanian devils, m defined as number of variable of given value.

Step 2: Random generation

Input weight parameter $x(t)$ developed randomness via TDOA method.

Step 3: Fitness function

It makes random solution from initialized values. It is calculated by optimizing parameter. Then the formula is derived in equation (12)

$$Fitness\,Function = optimizing\,[x(t)] \tag{12}$$

Step4: Exploration Phase

Sometimes, Tasmanian devil would rather eat the local carrion than go hunting. Tasmanian devil is surrounded by other raptors that pursue enormous prey and are unable to finish it. Additionally, until Tasmanian devil shows up, such creatures might not be consume enough of prey. Tasmanian devil chooses to eat these carrions in these situations. The way Tasmanian devils look for carrion in their ecosystem is comparable to how algorithms search for solutions in problem-solving environments. Mathematical models represent the ideas behind the Tasmanian devil's carcass-eating method. Thus it is given in equation (13)

$$C_i = Y_k \qquad i = 1,2,\ldots..,N, k \in \{1,2,\ldots.,N \mid k \neq i\} \tag{13}$$

here, C_i represented selected carrion by i^{th} Tasmanian devil; k represented randomly selected 1 to N while opposite is i and Y is represented the population mathematical method. After determining novel location for Tasmanian devil in final phase of the first strategy, this location is accepted if value of objective function is better at novel place. Thus it is given in equation (14)

$$Y_i = \begin{cases} Y_i^{new,S1} & F_i^{new,S1} < F_i; \\ Y_i, & otherwise \end{cases} \tag{14}$$

here, Y_i defines the i^{th} candidate solution; $Y_i^{new,S1}$ denotes new status i^{th} Tasmanian devil; $F_i^{new,S1}$ denotes objective function value, F_i denotes objective function values and Figure 2 shows the Flowchart of TDOA optimizing for HDNN.

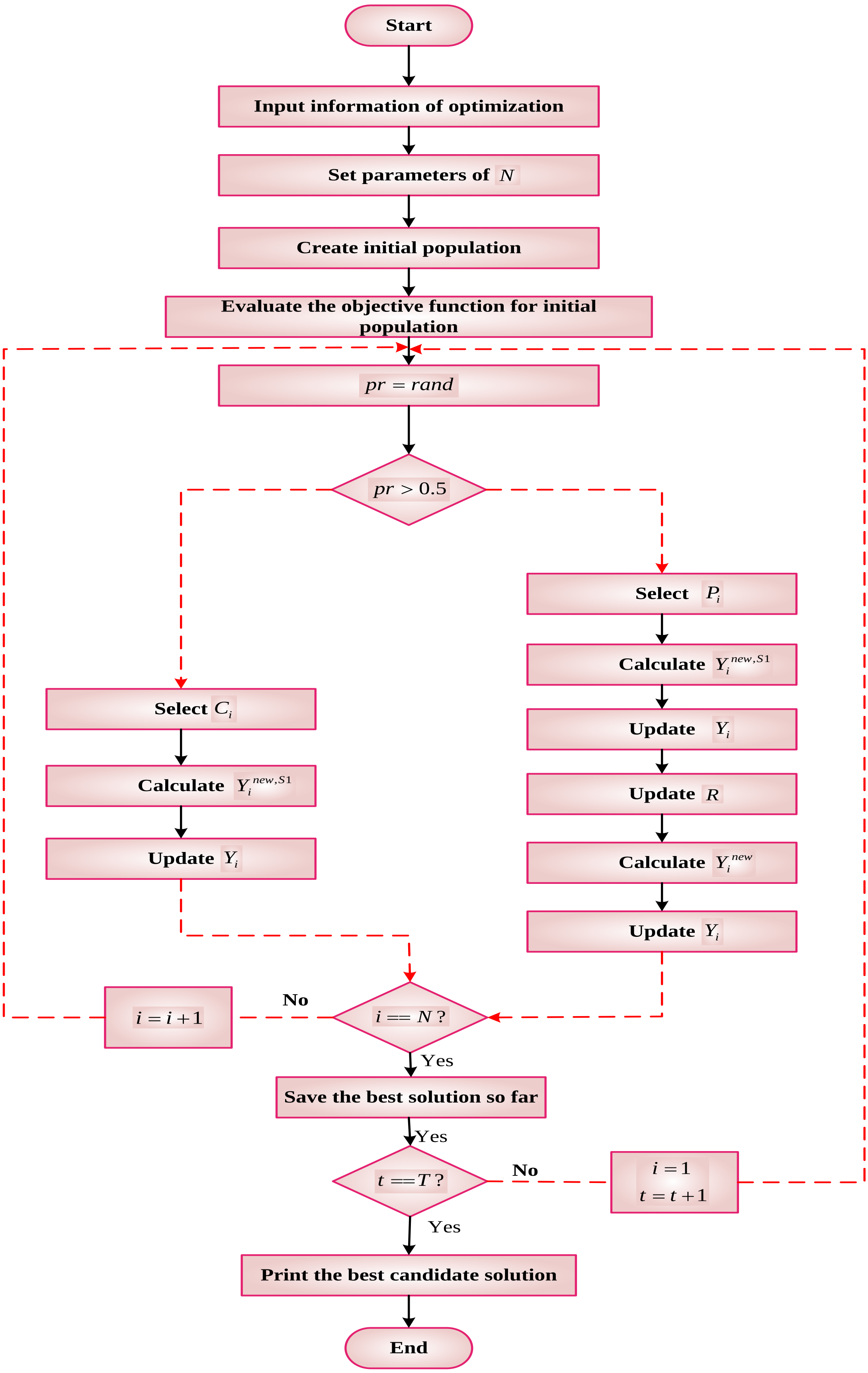

Figure 2: Flowchart of TDOA optimizing for HDNN

Step5: Exploitation phase for optimizing $x(t)$

The Tasmanian devil uses hunting and eating as its second means of survival. There are two phases to Tasmanian devil activity during an attack. It finds the victim and assaults it in the initial stage by scanning the surroundings. In second stage, it approaches victim and chases it to halt it, begin feeding. Other population members' positions are taken to be the prey's location. Thus it is given in equation (15)

$$P_i = Y_{k,} \qquad i = 1,2,...., N, k \in \{1,2,...., N \mid k \neq i\} \tag{15}$$

here, P_i defines selected prey by i^{th} Tasmanian devil; Y denotes population of Tasmanian devils and k defines a natural random number.

Step 6: Termination

The weight parameter value of generator $x(t)$ from Hamiltonian Deep Neural Network is optimized by utilizing TDOA; and it will repeat step 3 until it obtains its halting conditions $y = y + 1$.Then HDNN-AETC-ES effectively assesses the quality of Art Education Teaching Content and Evaluation System higher accuracy, lessening computational time and error.

IV. RESULT WITH DISCUSSION

Experimental results of HDNN-AETC-ES is deliberated. The simulation is implemented in PYTHON using PC through Intel core i5, 2.50 GHz CPU, 8GB RAM, windows 7utilizing Art teaching dataset. Attained result of HDNN-AETC-ES method is analyzed with existing techniques likes DAT-IT-DL, BAEP-ST-YAO and IAE-ES-EC systems.

A. Performance measures

Performance of proposed method is examined utilizing Accuracy, Precision, Recall, F1-Score, Computation Time and ROC performance metrics.

1) Accuracy

It describes detection rate that are correctly classified. The formula is derived in equation (16).

$$Accuracy = \frac{(TP + TN)}{(TP + FP + TN + FN)} \tag{16}$$

where, TP signifies true positive; TN denotes true negative; FP denotes false positive, FN specifies false negative.

2) Precision

It estimates positive result count while evaluating system of art education. Then the formula is derived in equation (17).

$$\Pr ecision = \frac{TP}{(TP + FP)} \tag{17}$$

3) Recall

Recall is a performance metric commonly used in binary tasks. It is given in equation (18)

$$\text{Re}call = \frac{TN}{(FP + TN)} \tag{18}$$

4) F1-score

The performance equation is provided in and the evaluation parameter of F1-score is analyzed. Then the formula is derived in equation (19).

$$F1 - Score = 2 \times \frac{recall \times precision}{recall + precision} \tag{19}$$

5) Computation Time

The computation time is very depending on the specific context, type of computation and the algorithm or method involved. Thus, given in equation (20)

$$T(n) = a\, f(n) + b \tag{20}$$

here, $T(n)$ is represented by computational time; n is represents the input size; a is represents the constant factor; $f(n)$ is represents the time complexity function describing the input size; b is represents the constant of additional fixed overhead.

6) ROC

It is graphical depiction of classification method at numerous threshold settings. It is made by plotting true positive rate compared to false positive rate for different threshold values. Here, ROC is classified in to true positive and false positive rate**.** Thus given in equation (21)

$$False\,Positive\,Rate = \frac{FP}{FP + TN} \tag{21}$$

B. Performance analysis

Figure 3 to 8 shows simulation results of HDNN-AETC-ES technique. The HDNN-AETC-ES is analysed to the existing DAT-IT-DL, BAEP-ST-YAO and IAE-ES-EC Respectively.

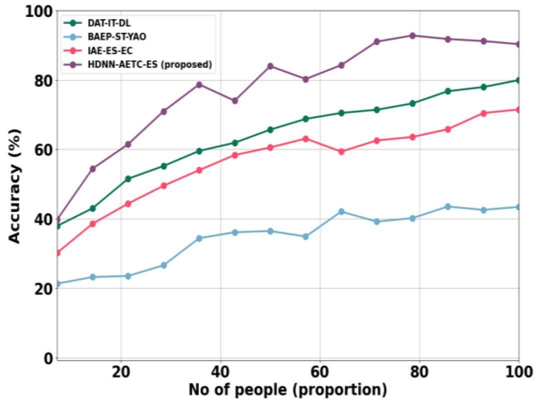

Figure 3: Accuracy analysis

Figure 3 depicts accuracy analysis. The HDNN-AETC-ES attains 18.41%, 24.08% and 32.57% higher accuracy at number of people taken for 20; 17.12%, 23.41% and 32.90% higher accuracy at number of people taken for60;24.33%, 25.36% and 26.95% higher accuracy at number of people taken for 100;which is analyzed with DAT-IT-DL, BAEP-ST-YAO and IAE-ES-EC methods respectively.

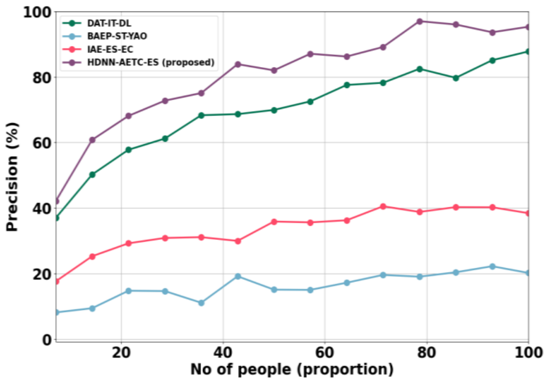

Figure 4: Precision analysis

Figure 4 depicts precision analysis. The HDNN-AETC-ES attains 20.31%, 21.08% and 22.57% higher Precision at number of people taken for 20; 27.12%, 29.41% and 31.10% higher Precision at number of people taken for 60; 25.66%, 27.33% and 28.90% higher Precision at number of people taken for 100; which is analyzed with DAT-IT-DL, BAEP-ST-YAO and IAE-ES-EC methods respectively.

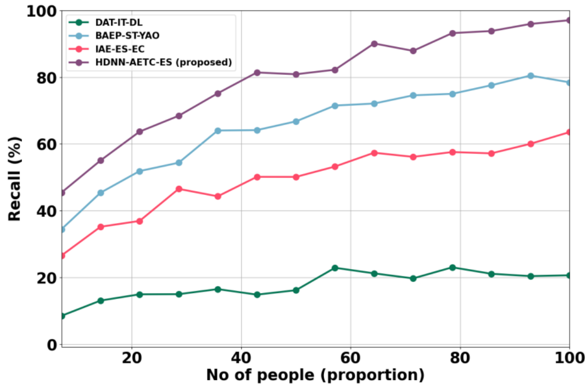

Figure 5: Recall analysis

Figure 5 depicts recall analysis. The HDNN-AETC-ES attains 21.41%, 22.08% and 23.55% higher recall at number of people taken for 20; 17.10%, 29.41% and 32.90% higher recall at number of people taken for 60;24.33%, 25.36% and 26.95% higher recall at number of people taken for 100; which is analyzed with DAT-IT-DL, BAEP-ST-YAO and IAE-ES-EC methods respectively.

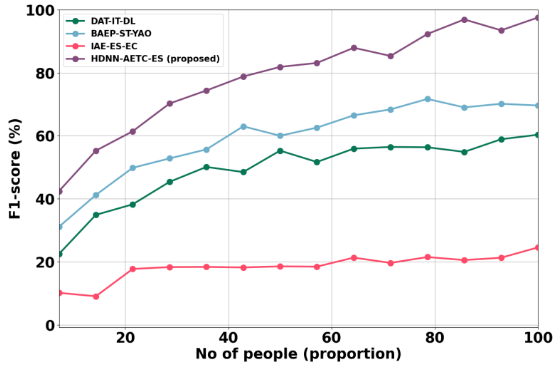

Figure 6: F1- score analysis

Figure 6 depicts F1- score analysis. The HDNN-AETC-ES attains 22.30%, 23.08% and 24.05% higher F1-Score at number of people taken for 20; 28.10%, 29.41% and 30.90% higher F1- Score at number of people taken for 60; 29.33%, 30.36% and 32.95% higher F1- Score at number of people taken for 100; which is analyzed with DAT-IT-DL, BAEP-ST-YAO and IAE-ES-EC methods respectively.

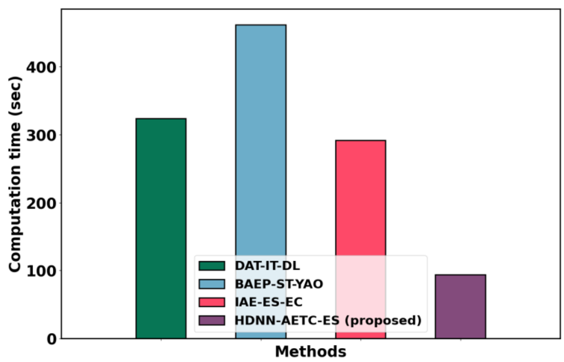

Figure 7: Computation time analysis

Figure 7 shows computation time analysis. The HDNN-AETC-ES attains 22.5%, 24.9%, and 26.3% lesser computation time analysed with existing techniques likes DAT-IT-DL, BAEP-ST-YAO and IAE-ES-EC methods respectively.

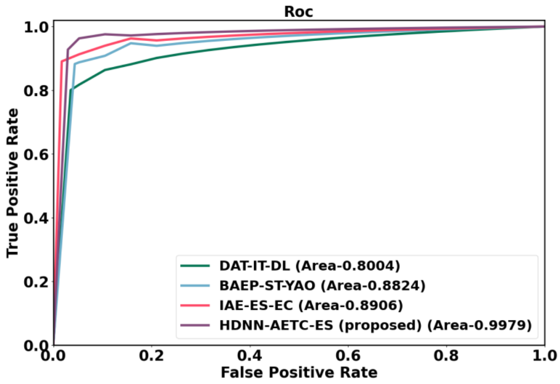

Figure 8: Roc analysis

Figure 8 displays ROC analysis. The HDNN-AETC-ES technique attains3.292%, 5.775%, and 1.331% greater ROC analysed with existing techniques likes DAT-IT-DL, BAEP-ST-YAO and IAE-ES-EC methods respectively.

C. Discussion

An efficient proposed HDNN-AETC-ES is proposed for Art Education Teaching Content and Evaluation System. It provides a thorough foundation for teaching art and inspires students to investigate, evaluate, produce, and enjoy art in a variety of settings and formats and findings demonstrate how useful the art education technology teaching platform is for school administration; the regression functions the pre-processing using ADGMF. The next Art Education Teaching Content using HDNN and Optimization of HDNN using TDOA; As a result, an Art education teaching content is eliminated. The F1- Score values of HDNN-AETC-ES are 30.85%, 31.96% and 32.23%higher than existing methods such as DAT-IT-DL, BAEP-ST-YAO and IAE-ES-EC methods respectively. Similar to this, the Art Education Teaching Content and Evaluation System is proposed 97.92% analyzed with Evaluation System is 80.42%. The proposed method HDNN-AETC-ES has high accuracy and F1- Score evaluation metrics than existing methods. Therefore, the comparative methods are expensive than the proposed technique. As a result, the proposed approach Art Education Teaching Content and Evaluation System is more effectively and efficiently.

V. CONCLUSION

In this section, HDNN-AETC-ES is successfully executed. Proposed HDNN-AETC-ES method is implementing a PYTHON for art teaching platform. According to the experimental results, HDNN-AETC-ES performed better when used with the Co-training technique than when used separately regards FI-Score, precision and recall. The performance of the proposed HDNN-AETC-AS method provides 21.41%, 22.08% and 23.55% higher recall, 22.30%, 23.08% and 24.05% higher F1- Score and 22.5%, 24.9%, and 26.3% lesser computation time when compared to existing methods such as DAT-IT-DL, BAEP-ST-YAO and IAE-ES-EC methods respectively.

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