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Constructing New Media Student Management System in Colleges and Universities

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Abstract: - The emergence and widespread use of new media have led to its integration into people's daily life. Because they utilize new media so frequently, students need social support and attention when using it for student management. Concerns about college student growth, societal advancement, concord, and the management impact of colleges and universities are all relevant. In this manuscript, constructing new media student management system in colleges and universities (CNM-SMS-CU-SASGNN-PO) is proposed. Initially input data are gathered from Students' dropout and academic success dataset. To execute this, input data is pre-processed, Surface Normal Gabor Filter (SNGF) and data normalizing; then pre- processed image is fed to new media construction utilizing Structure-Aware Siamese Graph Neural Network (SASGNN) to construct new media student management system. In generally, SASGNNdoesn't express adapting optimization strategies to determine optimal parameters to ensure construct new media student management system. Therefore, Parrot Optimizer (PO)is to optimize Structure-Aware Siamese Graph Neural Network which accurately constructs the student management system. Then the proposed CNM-SMS-CU-SASGNN-PO is implemented in Python and performance metrics analysis is done on metrics including Error Rate, NMSE (Normalised Mean Square Error), Accuracy, Root Mean Square Error (RMSE), and MAE (Mean Absolute Error). Performance of the CNM-SMS-CU-SASGNN-PO approach attains 18.27%, 23.65% and 32.60% higher accuracy, 19.55%, 22.85% and 32.10%lower RMSE and 18.47%, 22.55% and 32.79% lower Error Rate when analysed through existing techniques like The design of a college student achievement management system based on the GA-BP network (CSA-MS-BPNN) and artificial neural network analysis of students' academic performance in virtual learning environments (APS-VLE-ANN) approaches, respectively, are the subjects of Application of New Media in Student Management from the Perspective of Deep Learning and Evaluation and Analysis of Practical Effects (NM-SMS-CNN)..

Keywords: Colleges, New Media, Parrot Optimizer, Student management System, Structure-Aware Siamese Graph Neural Network, Surface Normal Gabor Filter, University.

I. INTRODUCTION

People's access to information has increased thanks to a variety of media sources in this quickly evolving world of digital and new media technology [1]. The bulk of youthful college students belong to the demographic that has been fully assimilated into the new media period and uses new media extensively [2]. Staff members in charge of student affairs at colleges and universities are already debating how to use new media to enhance student management and provide fresh settings for instruction on new media platforms [3]. One topic group of Chinese netizens using new media is college students [4]. The emergence of new media has changed how information is produced and disseminated and given birth to a variety of channels for publicity [5]. This has had an effect on how college students are managed [6].Colleges and universities can now disseminate traditional media content information more quickly and easily by switching from chain-like dissemination to network dissemination thanks to new media, which also increases the influence of information and its speed and breadth of dissemination [7, 8]. To achieve the information of student management, college and university administrations should fully utilize this information-dissemination instrument [9]. There is some evidence to support the realistic and workable use of new media for student management. Because of its mobility and ease of use, new media may be used in student administration, which allow them to overcome time and distance constraints [10]. Additionally, the low cost of new media information transmission [11]. The "Higher Education Law" of any country explains that the development of a scientific and technology culture is one of the objectives of higher education, produce highly competent experts with a creative spirit, and promote socialist modernization [12]. In order to better manage college students, several educational institutions have incorporated new media into their daily operations [13]. This has increased both the efficacy of their approaches and the effectiveness of student leadership. Universities and colleges now face greater challenges in managing their operations due to the rise of new media, and many of these establishments lack sound management

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principles and ideas [14, 15]. In order to assess the relatively out-dated management style in the context of new media, the research object for this study is college students' management [16]. It makes the following arguments: managers' authority has diminished, the management environment complicates current management, managers are ignorant of new media management, and students' own concerns revolve around things like the network [17].

Next, it makes a recommendation for creative management and evaluates the value of new media in student management work using deep learning. In the social media age, excellent student management is essential [18, 19]. Thus, one of the most important problems that today's student employees face is managing college students while utilizing digital media to its fullest potential [20].

Potential biases in data interpretation, the need for consistent adaptation to changing educational practices and technological advancements, and the dependence on correct data input for insightful analyses are some of the challenges associated using new media to manage students, particularly through deep learning and CNN-based evaluation. Limitations that may arise during the design of possible overfitting issues that lead to inaccurate predictions, the complexity of genetic algorithms and back propagation, and the use of BPNN in a GA-BP network-based college student accomplishment management system and the requirement for significant computational resources for efficient training and deployment. Challenges include the need for large and high-quality data sets for accurate predictions, sensitivity to biases and inaccuracies inherent in the input data, and the necessity of on-going monitoring and adjustment to account for shifting learning dynamics and patterns when using artificial neural network analysis (ANN) to assess student academic performance in virtual learning environments. The use of inaccurate information with BiLSTM, restricted interpretability because of the model's intricate design, and difficulties comprehending the prediction-generating process are some potential disadvantages of the Student-performulator.

In this research, a novel method for improving new media student management system constructing CNM-SMS-CU-SASGNN-PO is presented. The system seeks to achieve lower RMSE and MAE by combining PO with optimized SASGNN. Pre-processing methods is SNGF. The suggested approach is put into practice using Python and in contrast to the most recent techniques. It shows notable improvements in a number of measures, such as Accuracy, RMSE, MAE, MSE, NMSE and Error Rate.

Below is a summary of this research work's primary contribution:

- SASGNN is provided in order to maximize the accuracy of type categorization while minimizing the complexity of training and testing times.
- The CNM-SMS-CU-SASGNN-PO model's resilience enables precise new media student management system construction.
- An approach that is efficient in terms of computation for new media student management system construction, as SASGNN employs an effective-stage construction framework.
- The proposed method is put into practice on the Python platform, and its effectiveness is compared to that of current approaches.
- The proposed method yields superior outcomes when compared with other current techniques like NM-SMS-CNN, CSA-MS-BPNN and APS-VLE-ANN.

Remaining manuscripts arranged as below: sector 2 describes literature review; sector 3 depicts proposed method, sector 4 exhibits outcomes with discussions, sector 5 conclusion.

II. LITERATURE SURVEY

Numerous studies that were published in the literature were predicated on constructing new media student management system construction based deep learning; few of them were reviewed here,

Ji, et al. [21] has presented Utilising New Media in Student Management: A Deep Learning Perspective, Assessment, and Practical Effects Analysis. Here, the application and practical impact evaluation of new media in student management are carried out through the use of deep learning in this context. To enhance the efficacy and efficiency of student management activities, the following tasks must be completed by students: The literature was utilized to compile the research findings of current academic groups regarding how to handle student concerns in the context of new media. After introducing the BPNN-related technologies, the appropriate

CNN structure was built, in addition to an assessment index measuring how new media applications affect student management tasks. It attains higher Accuracy and it provides higher MAE.

Liu, et al. [22] have presentedthe GA-BP network-based architecture of a college student accomplishment management system. Here, a genetic algorithm and a neural network based on the BP neural network are combined to create a hybrid algorithm known as the GA-BP network. This helps to address the drawbacks of the BP neural network, such as its propensity to fall into local minima and slow convergence speed. Through the use of genetic algorithms' global search capabilities, the GA-BP network hybrid algorithm improves the link weights and thresholds of the BP network. This speeds up the completion of the global optimisation process by enabling the network to search from a better beginning value. It attains lower MAE and it provides higher RMSE.

Rivas, et al. [23] have presented examination of students' academic performance in virtual learning environments using artificial neural networks. Here, with the ability to study from anywhere in the world, this kind of environment allows for a higher enrolment because the student's physical location was no longer a barrier. In addition, virtual learning environments (VLEs) make it simpler to monitor student-teacher interactions and the actions of the teaching staff. As a result, it was feasible to evaluate the elements that influence students' academic performance to either rise or fall in online contexts. This work employs a number of automatic learning techniques, such is several types of Artificial Neural Networks (ANNs) and tree-based models, to a public dataset in order to discover the elements that impact university learning. It attains lower MSE and it provides higher NMSE.

Purnamasari, et al. [24] have presented By using digital learning models and media, student centres can provide assistance with classroom management. Here, The Curriculum states that student-cantered learning was one of its characteristics. Learning must be followed by mind-set modification. Learning was the process by which teachers guide students through teaching and learning activities in a classroom. Additionally, learning should be enjoyable. Teachers need to adopt a new paradigm for teaching in the digital age. It's time for educators to use the internet and new technological advancements as teaching tools. The question was how to use knowledge in the digital era and the advantages of doing so, as well as how to replace the out-dated paradigm in education. It attains lower Error rate and it provides higher RMSE.

Yousafzai, et al. [25] have presented Student-performulator: hybrid deep neural network used to measure students' academic performance. Thus, there was an immediate need to establish an automated technique for forecasting student success. In recent years, deep learning has enabled researchers to automatically extract high-level characteristics from raw data. These sophisticated feature representation approaches allow for better performance on difficult jobs. This study looks at the attention-based Bidirectional Long Short-Term Memory (BiLSTM) deep neural network model, which successfully predicts student performance (grades) using historical data.Using an attention mechanism model and the most sophisticated BiLSTM, have examined current research difficulties based on sophisticated feature categorization and prediction. It attains higher Accuracy and it provides higher MAE.

Li, et al. [26] have presented Intelligent sensor algorithm application for information fusion in student management. Here, uncertainty theory and multisensory data fusion technology are integrated to develop a comprehensive set of multisensory data processing tools for student information. Additionally, it provides a thorough theoretical mathematical basis for the principles of student management information fusion. In summary, this study combines research and simulation studies to create a model of intelligent student management. Through the use of simulation research, it was recognized that the strategy put out in this work can successfully enhance student management. It attains higher Accuracy and it provides higher NMSE.

Gupta, et al. [27] have presented An information retrieval system based on deep learning and artificial intelligence for evaluating student performance. In this research study, a model centred on higher education institutions (HEIs) has been proposed to illustrate the difficulties in balancing the need for strict control and ongoing quality improvement. Following data collection, the important features were chosen for data analysis utilizing dedicated gains, which were created by combining dedicated weight constants and information gain. After that, regression analysis and artificial neural networks—two deep learning techniques—were used to evaluate the academic calibre of colleges. It produces a greater error rate and a lower mean square error.

III. PROPOSED METHODOLOGY

In this sector, Optimized SASGNN depend Constructing new media for student management (CNM-SMS-CU-SASGNN-PO) is proposed. This process comprises of four steps likes data collection, pre-processing, Construction, and optimization. In the proposed new media constructing system, Students' dropout and academic success dataset undergo pre-processing to prepare them for further analysis. Following the pre-processing; the final step involves employing a SASGNN for constructing new media for student management. Gains of CNM-SMS-CU-SASGNN-PO include better predictive analytics for identifying students who are at-risk, more advanced data processing capabilities for customized learning experiences, and the ability to automate administrative tasks, which will increase staff and faculty productivity and lessen their workload. The Parrot Optimizer method is introduced for training the SASGNN. Block diagram of CNM-SMS-CU-SASGNN-PO approach is represented in Fig 1. As a result, a thorough explanation of each step is provided below.

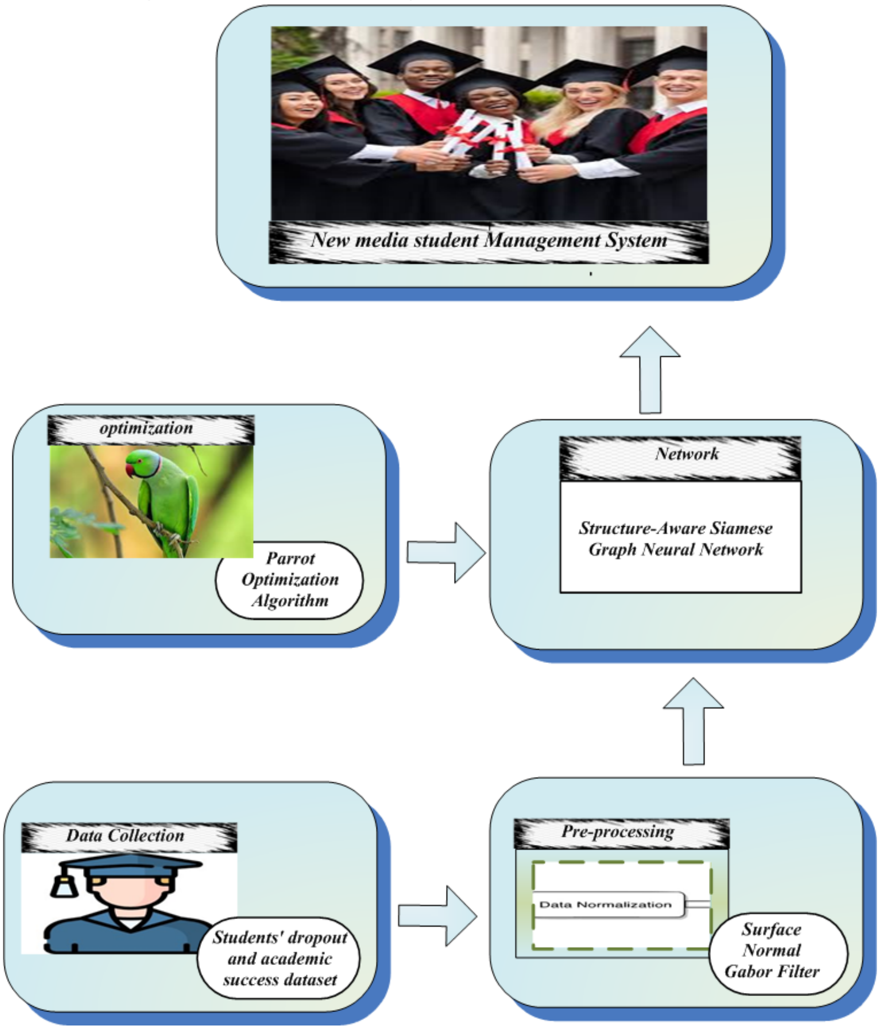

Figure1: Block Diagram for Proposed CNM-SMS-CU-SASGNN-PO Method

A. Data Acquisition

The Students' Dropout and Academic Success dataset [28] is the source of the data used in this section. a dataset regarding students enrolled in various undergraduate programmes, such as agronomy, design, education, nursing, journalism, management, social services, and technology, gathered by a higher education institution from several different databases. In addition to the students' ultimate academic standing at the conclusion of the first and second semesters, the dataset includes demographics, social-economic features, and academic paths as of the time of enrolling. Classification models are built utilising the data to predict academic success and student dropout. The challenge is framed as a three-category classification job with a substantial bias towards one class.

B. Pre-processing Using Surface Normal Gabor Filter

In this section, Surface Normal Gabor Filter (SNGF) [29] technique is utilized to normalize the collected input data. The advantages of the Adaptive Two-Stage Unscented Kalman Filter are found in its ability to withstand uncertain system dynamics, improve construction accuracy of student new media progress, optimize resource allocation, and assist higher education institutions in making better decisions while developing new media student management systems. The new media student management system's integration of Surface Normal Gabor Filters aims to improve image processing capabilities for texture feature extraction from visual input. The efficacy of Surface Normal Gabor Filters can be further increased when paired with data normalization strategies like standardization or min-max scaling, particularly when building a new media student management system for schools and institutions; and its given as equation (1),

$$g(s, y \mid \lambda, \phi, \varphi, \sigma, \gamma) = \exp\left(-\frac{s'^2 + \gamma^2 y'^2}{2\sigma^2}\right)\exp\left[i\left(2\pi\frac{x'}{\lambda} + \varphi\right)\right] \quad (1)$$

Where, λ denotes the volume of data, ϕ denotes the Gabor function's orientation φ denotes phase difference from the Gabor kernel's centre, σ denotes Gaussian envelope's standard deviation, and γ denotes spatial aspect of data. Data normalization is a pre-processing technique that creates a common scale for a dataset's characteristics, which frequently leads to better model convergence and performance; and its given as equation (2),

$$g_x(s, y) = \exp\left(-\frac{s'^2 + \gamma^2 y'^2}{2\sigma^2}\right)\cos\left[i\left(2\pi\frac{x'}{\lambda} + \varphi\right)\right] \quad (2)$$

Here, $gr(x, y)$ is indicated as the actual part of GF. When it comes to visual data, normalization can lessen changes in data point, all of which can have an impact on how well image processing algorithms like Gabor Filters work.Before feeding the visual data into the Surface Normal Gabor Filters, the system applies data normalization techniques to make sure the filter operates on a consistent and uniform representation of the data; and its given as equation (3),

$$g_k(s, y) = \exp\left(-\frac{s'^2 + \gamma^2 y'^2}{2\sigma^2}\right)\sin\left[i\left(2\pi\frac{x'}{\lambda} + \varphi\right)\right] \quad (3)$$

Where, $g_k(s, y)$ denotes imaginary part of GF. This may result in increased task accuracy overall and stronger generalization to data that has not yet been observed. Moreover, combining Surface Normal Gabor Filters with data normalization can help create a system that is more flexible and scalable. The system grows more adaptable to environmental changes because normalization procedures can help handle differences in the distribution and scale of input data; and it's given as equation (4),

$$G_{D.K}(s, y) = \sum_{n=-u}^{u}\sum_{l=-u}^{u}\left[g_k(n,l).m_Y(s+n, y+l) - g_i(n,l).m_X(x+n, y+l)\right] \quad (4)$$

Where, $G_{D.I}(s, y)$ denotes real component of GF; m_Y *and* m_X denotes normal vector indices of the surface, n *and* l denotes the kernel window's indices. When building a new media student management system, combining Surface Normal Gabor Filters with data normalization techniques allows for more efficient processing and analysis of visual data, which improves the system's performance, dependability, and usability for a range of educational applications in colleges and universities; and its given as equation (5),

$$G_{D.T}(s, y) = G_{D.I}(s, y)^2 + G_{D.K}(s, y)^2 \quad (5)$$

Where, $G_{D.K}(s, y)$ denotes imaginary component of GF. By processing ATSUKF method the input data's are normalized. Then the pre-processed images are fed to prediction

C. Constructing New Media Student Management System Using Structure-Aware Siamese Graph Neural Network(SASGNN)

SASGNN [30] spoke about building new media student management systems in universities and colleges in this field. Building a new media student management system in colleges and universities benefits from the deployment of a Structure-aware Siamese Graph Neural Network as it can customise suggestions, model complex student relationships efficiently, and improve system construction through graph-based analysis. Enhancing student engagement and academic success through the use of sophisticated graph-based algorithms to analyse intricate relationships between students, courses, and resources is the aim of integrating a Structure-aware Siamese Graph Neural Network into new media college and university student administration systems; a

Structure-aware Siamese Graph Neural Network into new media college and university student administration systems; and its given as equation (6),

$$M^{(j)} = \varepsilon(\tilde{E}^{-\frac{1}{2}}\tilde{A}\tilde{E}^{-\frac{1}{2}}M^{(j-1)}V^{(j-1)}) \qquad (6)$$

Where, $M^{(j)}$ denotes embedding matrix, $\varepsilon(\cdot)$ denotes activation function, $V^{(j-1)}$ layer-specific trainable weight matrix; A denotes adjacent matrix; $\tilde{E}$ denotes degree matrix. By utilizing Siamese architectures, SASGNN enhance their capabilities by facilitating direct comparison and similarity measurement between entities; and it's given as equation (7),

$$H_s = \|A - C\|_O^2 + \beta\|C\| \qquad (7)$$

Where, C denotes symmetric matrices; β denotes trade-off parameter. In the long term, this strategy seeks to create an educational environment that is more effective and focused on the needs of the students by streamlining administrative trends that can improve institutional decision-making processes; and its given as equation (8),

$$b_{ij}^{'} = \|g_i - g_j\|_2 \qquad (8)$$

Where, $b_{ij}^{'}$ denotes layers of student management system g denotes embedding data. The complex relationship structures present in student data can be effectively modelled by SASGNNs, which provide a versatile response to the challenges encountered by educational establishments; and it's given as equation (9),

$$H_c = \frac{1}{|F_t|}\sum_{(u_i,u_j)\in F_t}\left[x_{ij}b_{ij}^{'2} + (1 - x_{ij})\cdot \max(0, n - b_{ij}^{'})^2\right] \qquad (9)$$

Where, (u_i, u_j) denotes patient encounter pair; $i \; and \; j$ denotes data encounting parameters; F_t denotes data constructing for application; n denotes data margin; x_{ij} denotes labels of the data point. The fundamental strength of SASGNN is their ability to embed structural information into the graph topology, allowing them to capture linkages and dependencies that standard models would miss; and it's given as equation (10),

$$H_e = \frac{1}{|F_t|}\sum_{(u_i,u_j)\in F_t} -\left[x_{ij}\,\log(\hat{x}_{ij}) + (1 - x_{ij})\,\log(1 - \hat{x}_{ij})\right] \qquad (10)$$

Here, $\hat{x}_{ij}$ denotes encounter-level pairwise patient similarity. . Finally, SASGNN Construct new media student management system. Here, Parrot Optimizer (PO)is employed to optimize the SASGNN. Here, PO is employed for adjusting SASGNN's weight and bias parameters.

D. Optimization Using Parrot Optimizer

The proposed Parrot Optimizer (PO) [31] is utilized to enhance weights parameters $x_{ij} and\ b_{ij}^{'}$ of proposed SASGNN. The parameter $x_{ij} and\ b_{ij}^{'}$ is implemented for increasing the accuracy and reducing RMSE. The species of parrot is a popular choice among pet owners because of its endearing qualities, strong attachment to its owners, and simplicity of training. Four different behavioural features that parrot exhibits foraging, remaining, talking, and fear of strangers have been identified through breeding attempts. Colleges and institutions gain advantage from the Parrot Optimizer's capacity to effectively distribute resources, improve scheduling, and adjust to changing student needs while building a new media student management system. Here, step by step procedure for obtaining appropriate SASGNN values using PO is described here. To creates a uniformly distributed population for enhancing the ideal SASGNN factors. The entire step technique is then presented in below,

Step1: Initialization

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

$$P = \begin{bmatrix} p_1^1 & p_1^2 & \cdots & p_1^D \\ p_2^1 & p_2^2 & \cdots & p_2^D \\ p_3^1 & p_3^2 & \cdots & p_3^D \\ p_4^1 & p_4^2 & \cdots & p_4^D \end{bmatrix} \quad (11)$$

Where, $rand(0,1)$ indicates a random integer between 0 and 1; P denotes initial position of parrot; d denotes lower bound on the search space; q denotes upper bound on the search space

Step2: Random generation

Arbitrarily generated input factors. Optimal fitness values were selected based on clear hyperparameter conditions.

Step 3: *Fitness Function*

The goal function determines the fitness of the system. In order to ascertain the fitness function,

$$Fitness\,Function = optimizing\ [x_{ij}\, and\ b_{ij}^{'}] \quad (12)$$

Where, x_{ij} is used for increasing the Accuracy and $b_{ij}^{'}$ is used for decreasing the RMSE.

Step 4: Foraging behavior for optimizing x_{ij}

When foraging in PO, they first use their ability to see where the food is and/or their ability to judge the owner's position to determine the approximate location of the food before taking off in that direction. As a result, the positional movement is determined by the equation: (13)

$$Z_i^{t+1} = (Z_i^t - Z_{best}) \cdot Levy(\dim) + x_{ij} + rand(0,1) \cdot (1 - \frac{t}{Max_{iter}})^{\frac{2t}{Max_{iter}}} \cdot Z_{mean}^t \quad (13)$$

Where, Z_i^t denotes present location; Z_i^{t+1} denotes the location of the succeeding update; Z_{mean}^t denotes present population's average inside location; $Levy(\dim)$ Denotes levy distribution; Z_{best} denotes best position; $(Z_i^t - Z_{best}) \cdot Levy(\dim)$ denotes moment based one position in relation to the owner; $(1 - \frac{t}{Max_{iter}})^{\frac{2t}{Max_{iter}}} \cdot Z_{mean}^t$ denotes observation of the solution.

Step 5: *Staying behavior for optimizing* $b_{ij}^{'}$

A highly sociable bird, the parrot's primary staying habit is an abrupt flight to any area of its owner's body, where it remains still for a certain period of time. This procedure can be presented as: equation (14)

$$Z_i^{t+1} = (Z_i^t - Z_{best}) \cdot Levy(\dim) + rand(0,1) \cdot ones(1,\dim) \times b_{ij}^{'} \quad (14)$$

Where, $ones(1,\dim)$ represents every vector dimension.

Step 6: Communicating behaviour for optimizing x_{ij}

Due to their innate social nature, parrots exhibit close group communication. This communication behaviour includes both flying to the flock and conversing outside of the flock. The flock's centre is represented in the PO by the mean location of the current population, and both behaviours are taken to occur equally often; and it's given as equation (15),

$$Z_i^{t+1} = \begin{cases} 0.2 \cdot rand(0,1) \cdot (1 - \frac{t}{Max_{iter}}) \cdot (Z_i^t - Z_{mean}^t) \cdot x_{ij}, & R \le 0.5 \\ 0.2 \cdot rand(0,1) \cdot \exp(-\frac{t}{rand(0.1).Max_{iter}}), & R > 0.5 \end{cases} \quad (15)$$

Here, $0.2 \cdot rand(0,1) \cdot (1 - \frac{t}{Max_{iter}}) \cdot (Z_i^t - Z_{mean}^t)$ denotes the act of a parrot communicating by joining a group; $0.2 \cdot rand(0,1) \cdot \exp(-\frac{t}{rand(0.1).Max_{iter}})$ denotes act of a parrot taking off right away after communicating. Figure2 shows that Flow Chart of PO for Optimizing SASGNN.

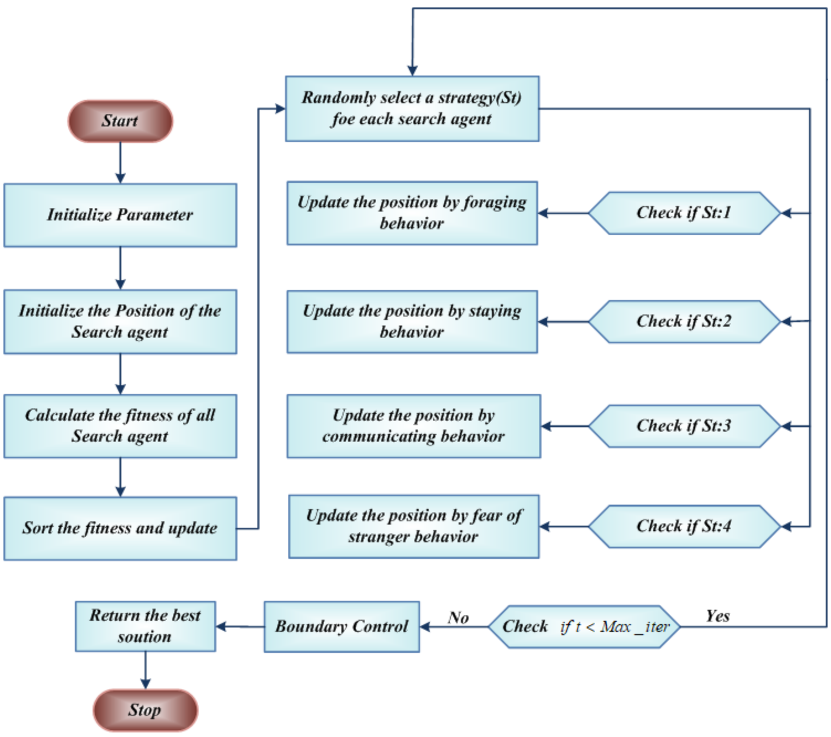

Figure2: Flow Chart of PO for Optimizing SASGNN

Step 7: Fear of strangers' behaviour b'_{ij}

Birds in general and parrots specifically, have an innate fear of strangers. Their tendency to keep their distance from strangers and seek refuge with their owners is an effort to find a safe haven.

$$Z_i^{t+1} = Z_i^t + rand(0,1)\cdot\cos(0.5\pi\cdot\frac{t}{Max_{iter}})\cdot(Z_{best} - Z_i^t)b'_{ij} \\ -\cos(rand(0,1)\cdot\pi)\cdot(1-\frac{t}{Max_{iter}})^{\frac{2}{Max_{iter}}}\cdot(Z_i^t - Z_{best}) \tag{16}$$

Where, $rand(0,1)\cdot\cos(0.5\pi\cdot\frac{t}{Max_{iter}})\cdot(Z_{best} - Z_i^t)$ indicates the act of turning to fly in the direction of its owner; $\cos(rand(0,1)\cdot\pi)\cdot(1-\frac{t}{Max_{iter}})^{\frac{2}{Max_{iter}}}\cdot(Z_i^t - Z_{best})$ denotes moving away from stranger.

Step 8: Termination Criteria

The weight factor value of producer x_{ij} *and* b'_{ij} Structure-Aware Siamese Graph Neural Network (SASGNN)is optimized by utilizing parrot Optimizer (PO)and Until it meets its stopping requirement, $P = P + 1$, it will perform step 3 once again. Then CNM-SMS-CU-SASGNN-PO effectively construct new student management system with low RMSE and MAE

IV. RESULT AND DISCUSSION

Experimental results of CNM-SMS-CU-SASGNN-PO are discussed. The simulation is implemented in Python using Students' dropout and academic success dataset. The CNM-SMS-CU-SASGNN-PO model is to construct new student management system using several performance metrics like Accuracy, RMSE, MAE, MSE, NMSE, SNR and Error Rate Attained result of CNM-SMS-CU-SASGNN-PO method is analysed with existing techniques likes NM-SMS-CNN [21], CSA-MS-BPNN [22] and APS-VLE-ANN [23] methods.

A. Performance Measures

This is a crucial step for determining the exploration of optimization algorithm. Performance measures to evaluate to access performance such as such as Accuracy, RMSE, MAE, MSE, NMSE, SNR and Error Rate are analysed.

1) Accuracy

Accuracy describes classification rate that are correctly classified. The formula is derived in equation (17).

$$Accuracy = \frac{(TP + TN)}{(TP + FP + TN + FN)} \tag{17}$$

Where, TN signifies True Negative; TP signifies True Positive; FP signifies False Positive and FN characterizes False Negative.

2) Root Mean Square Error

A regression model's predictive accuracy for numerical outcomes is evaluated using the Root Mean Squared Error (RMSE). It determines the square root of the mean of the squared discrepancies between the observed and anticipated values. It is given in equation (18),

$$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}$$

(18)

Here, n denotes the amount of observations, $RMSE$ denotes the root mean square error, y_i means the predicted values and $\hat{y}_i$ signifies the observed values.

3) Mean Absolute Error (MAE)

A machine learning model's performance may be assessed using a variety of metrics, one of which is the Mean Absolute Error (MAE). Each data point's prediction error is calculated separately, and the error is then converted to a non-negative value. It is given in equation (19),

$$MAE = \frac{1}{n}\sum_{i=1}^{n}|y_i - \hat{y}_i|$$

(19)

Where, MAE denotes the mean absolute error; n means the amount of data points, y_i signifies the observed value and $\hat{y}_i$ means the predicted values.

4) MSE

A metric for assessing a regression model's accuracy is the MSE. The average of the squares of the variations between the dependent variable's actual and expected values is computed. It is given in equation (20),

$$MSE = \frac{1}{n}\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2$$

(20)

Here, n means the number of data points, MSE denotes the mean squared error, Y_i means the observed value and $\hat{Y}_i$ means the predicted values.

5) NMSE

One metric used to assess a regression model's performance is the Normalised Mean Square Error. Thus it is given in equation (21)

$$NMSE = \frac{1}{m}\sum_{i=1}^{m}\left(\frac{z_i - \hat{z}_i}{\max(y) - \min(y)}\right)^2$$

(21)

Where, m denotes number of data point; z_i denotes true value; $\hat{z}_i$ denotes predicted value and $\max(y)$ *and* $\min(y)$ denotes maximum and minimum value.

6)Error Rate

The Error rate, also known as the classification error rate, is a metric that measures a classification model's overall accuracy. It denotes the percentage of erroneously classified cases in the dataset and it is given by the equation (22).

$$ErrorRate = \frac{FP + FN}{TP + TN + FP + FN}$$

(22)

B. Performance analysis

Figure 3 to 8 shows simulation result of CNM-SMS-CU-SASGNN-PO method. The performance metrics are analysed with existing NM-SMS-CNN, CSA-MS-BPNN and APS-VLE-ANN methods.

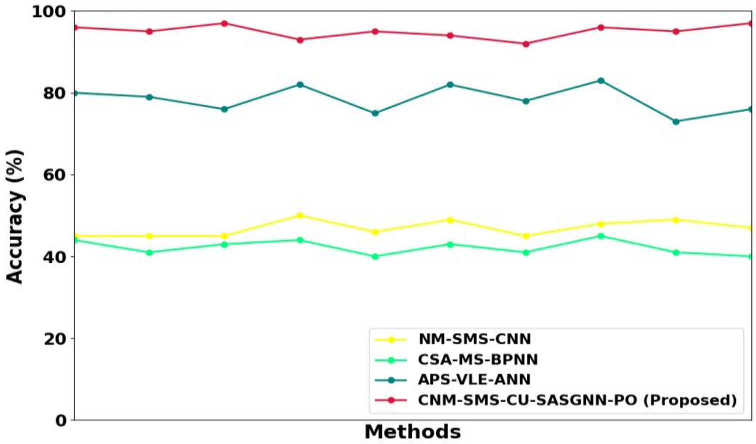

Figure3: Performance analysis of Accuracy

Figure 3 shows accuracy analysis. The accuracy graph shows how well a proposed model for a student management system works and can be a useful tool for evaluating its effectiveness. This type of graph usually shows the accuracy rate of the system over time, enabling stakeholders to examine the system's efficacy in handling student data visually. The proposed of CNM-SMS-CU-SASGNN-PO attains 18.27%, 23.65% and 32.60% higher Accuracy for New media construction which are analysed with existing NM-SMS-CNN, CSA-MS-BPNN and APS-VLE-ANN methods respectively.

Figure 4 shows RMSE analysis. The RMSE graph above provides a statistical measure of the discrepancies between values that a model predicts and the actual values. The above RMSE graph can be used to assess how accurate expected outcomes are in the context of a student management system. The CNM-SMS-CU-SASGNN-PO method attains 19.55%, 22.85% and 32.10% lower Root Mean Square Error for methods with NM-SMS-CNN, CSA-MS-BPNN and APS-VLE-ANN correspondingly

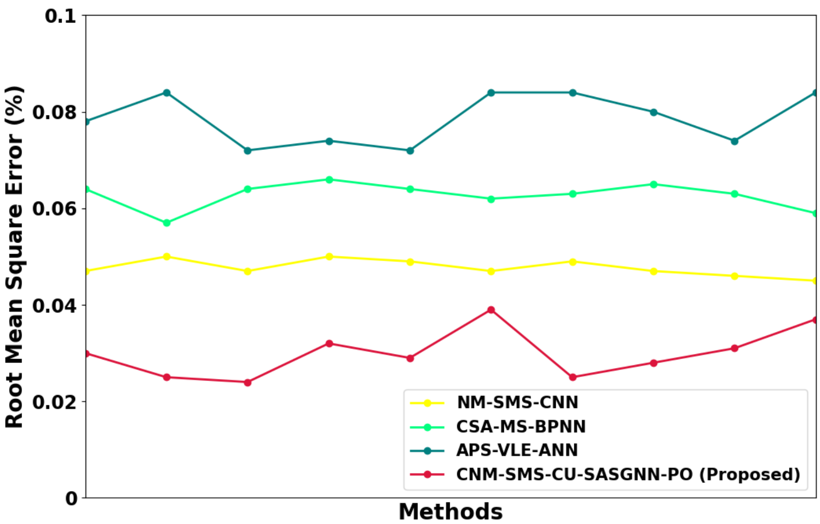

Figure 4: Performance analysis of RMSE

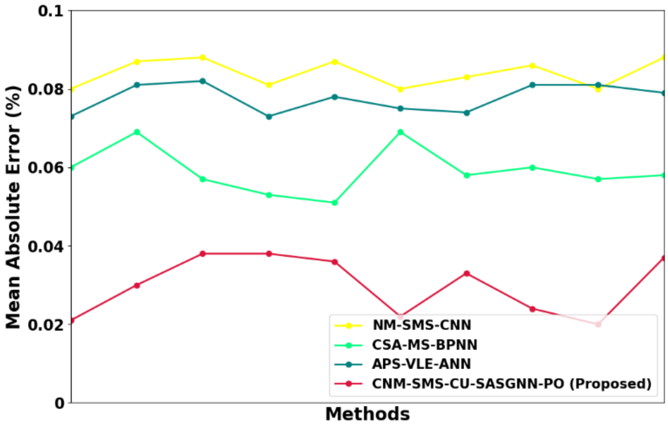

Figure 5: Performance analysis of MAE

Figure 5 shows MAE analysis. For the purpose constructing new media, the above MAE graph would show the fluctuation in error over the dataset, emphasizing times of high accuracy. The CNM-SMS-CU-SASGNN-PO method attains 19.17%, 22.75% and 32.98% lower mean Absolute Error for methods with existing NM-SMS-CNN, CSA-MS-BPNN and APS-VLE-ANN respectively.

Figure 6 shows MSE analysis. This MSE graph functions as a quantitative indicator, making it possible to spot patterns and identify changes that should be made to improve the system's ability to effectively manage student data and tasks. The proposed CNM-SMS-CU-SASGNN-PO method attains 19.17%, 23.95% and 32.98% lower mean Absolute Error for methods with existing NM-SMS-CNN, CSA-MS-BPNN and APS-VLE-ANN correspondingly.

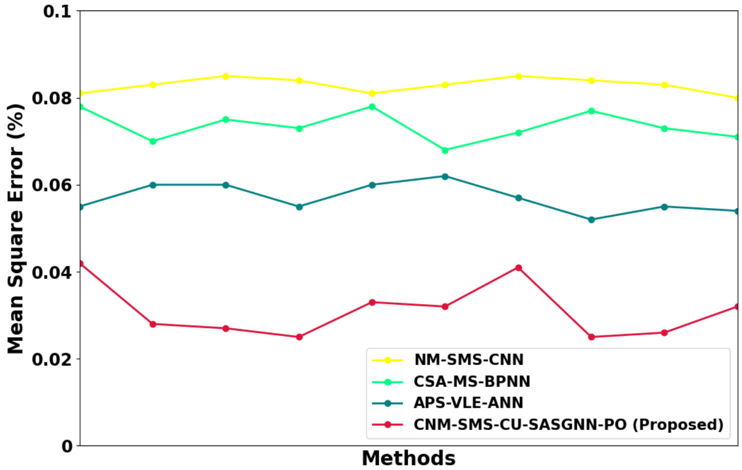

Figure 6: Performance analysis of MAE

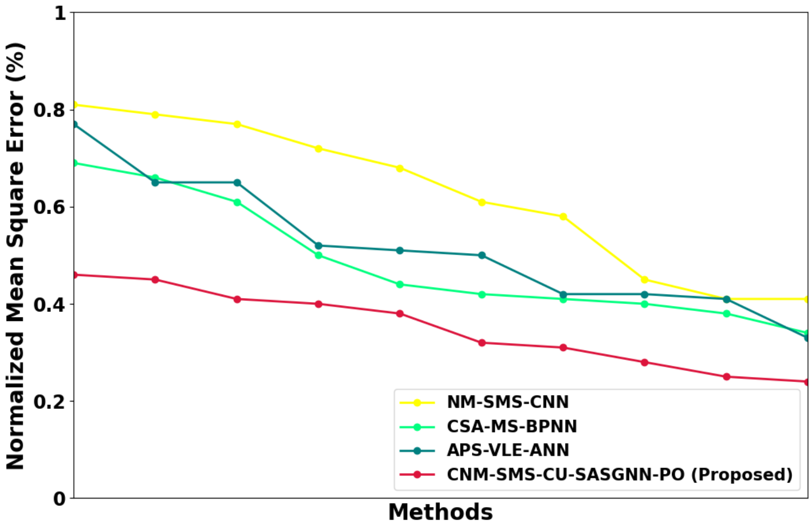

Figure 7: Performance analysis of MAE

Figure 7 displays NMSE analysis. In order to provide a comprehensive view of the model's performance, this NMSE graph displays the difference between the actual and predicted values, scaled to the data scale. The proposed CNM-SMS-CU-SASGNN-PO method attains 19.77%, 22.75% and 31.88% lower mean Absolute Error for methods with existing NM-SMS-CNN, CSA-MS-BPNN and APS-VLE-ANN respectively.
Figure 8 shows Error Rate analysis. The above Error rates graph give an indication of how accurate and dependable the new media construct model is by quantifying the difference between the observed and anticipated student management system. The proposed CNM-SMS-CU-SASGNN-PO method attains 18.47%, 22.55% and 32.79% lower Error Rate for methods with existing NM-SMS-CNN, CSA-MS-BPNN and APS-VLE-ANN respectively.

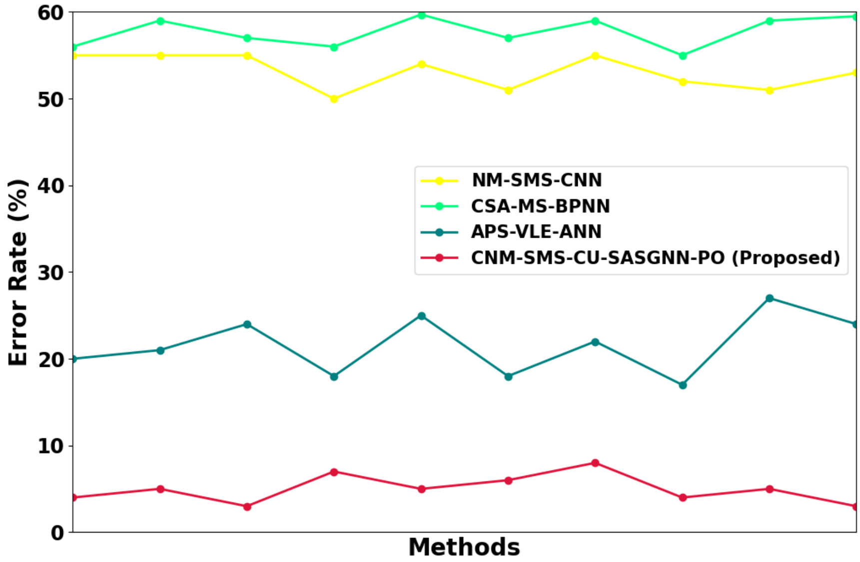

Figure 8: Performance analysis of Error Rate

C. Discussion

A novel CNM-SMS-CU-SASGNN-PO model to constructs new media for student management system. The CNM-SMS-CU-SASGNN-PO method involves encompasses SNGF depend Students' dropout and academic success dataset pre-processing; then, SASGNN model utilized for performing student new media construction which construct student management new media. The construction of Students' dropout and academic success dataset, average highest results of method were compared to average outcomes given in existing techniques likes existing NM-SMS-CNN, CSA-MS-BPNN and APS-VLE-ANN. This is less expensive than comparing to the proposed method. However, the proposed technique employs faster SASGNN in conjunction by PO, resultant in further efficient collection of data, enhanced ability to deal by method over-fitting problem. Therefore, the comparative methods are expensive than the proposed technique. As a result, the proposed technique construct student management new media using optimizes neural network more effectively and efficiently.

V. CONCLUSION

In this section, CNM-SMS-CU-SASGNN-POis successfully executed. The simulation is implemented in Python. According to the experimental results, CNM-SMS-CU-SASGNN-PO performed better when used with the Co-training technique than when used separately regards MAE and Error rate. The performance of CNM-SMS-CU-SASGNN-PO approach attains 19.17%, 23.95% and 32.98% lower MSE, 19.17%, 22.75% and 32.98% lower MAE, 19.77%, 22.75% and 31.88%lower NMSE when analysed with existing methods like NM-SMS-CNN, CSA-MS-BPNN and APS-VLE-ANN respectively. Future research suggests creating a system where the knowledge displayed in the virtual classroom is arranged more relevantly based on how frequently a student uses references. In addition, conducting a case study with a larger class size allows for a comparison of the outcomes.

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