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Research Article

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APPLICATION ANALYSIS OF 5G INTELLIGENT COMMUNICATION TECHNOLOGIES IN THE FIELD OF SPORTS DISTANCE EDUCATION

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Abstract—
China has entered a new era of fifth generation (5G)technology, college students are relatively quick to accept new things, and the traditional teaching mode cannot fully stimulate students' interest in sports activities. Therefore, the 5G integrated teaching mode based on communication technology is an inevitable trend of sports distance education curriculum reform.Technologyand sports have been deeply intertwined for a long time. However, new opportunities are now rapidly expanding on the Internet, and the result is a huge data.This paper proposes a novel 5G framework for an efficient sports distance education. Initially, the sports dataset is preprocessed using normalization. The features are extracted using Principal Component Analysis (PCA). Then, feature selection process is done. Classification is done using Hierarchical Multi-scale Convolutional Neural Network (HM-CNN). The 5G network is initialized using Enhanced Transmission Control Protocol (E-TCP) for an efficient data transmission. The performance of the proposed system is improved by Elevated Ant Colony Optimization Algorithm (EACO). Using MATLAB simulation tool, we analyze and compare the performance of the proposed system with the existing methodologies. The results show that the experimental results of 5G integrated teaching reform based on communication technology show that the teaching reform experiment can effectively increase the number of college students' sports population

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I. INTRODUCTION

Education in China has become more computer-aided as a result of the country's rapid educational informatization. Teachers now have a wider range of teaching techniques to choose from than in the past, and multimedia teaching formats have several potential uses. Teachers may make full use of "vision" to encourage pupils to think and obtain new information by using more flexible techniques of explaining and asking questions on the platform. Human rhythmic motions are used to study a kind of physical education, art, and performance. It's tough to communicate to language pupils the emotional connotations of sports and the accompaniment's rhythm throughout the instruction process. The content of the course is accurately represented in the course materials. Images that encourage students to achieve adequate cognition, are comprised of multimedia, and generate interest in learning, as well as enhance knowledge and memory, may be found frequently on the page. Time, space, and other constraints cannot be used to implement education on the network, and the network's features cannot be used to address issues that occur. Physical education network teaching has the potential to turn students from passive information receivers into active learners from the standpoint of mobilising their learning zeal. Computers are now widely used in the teaching profession due to the advancement of network multimedia technology and the enhancement of teaching environment in institutions. This rich and diversified carrier will be used to impart important scientific information to students in an effort to increase students' comprehension and understanding via teaching techniques of relevant scientific knowledge. Even those who haven't been able to take use of the internet teaching platform in the past can now learn about sports whenever and wherever they want thanks to it. This increases the amount of teaching materials that can be shared across schools and sports enthusiasts. To enable more college students and nonschool sports aficionados study online, the timeliness, interaction, and presentation of multimedia networks makes it possible to bring sports learning into families and communities, as well as to any location with a network. However, if multiple indices might lead to complicated manipulations and interference with duplicate information, depending on the FPGA, it will be impossible to accomplish the aim. It also has the capability of reflecting data from the original indication. The final estimate is based on the real 5G technology assessment approach for assessing instructors' teaching abilities. Using this sort of assessment approach, the final outcome of the instructor and student performance evaluation may be analysed to represent the teacher's direction in a reasonably objective manner. We must take into account both absolute and relative measures. Principal

component analysis is used to restrict the overall evaluation of the teacher's teaching of content skills. The primary goal is to create a traditional national sports educational resource platform in China, where educational resources are very limited. This project's goal is to adhere to the conventional sports education resource platform's resource integration strategy while also meeting the educational demands of learners across time and geography. Here initially the sports database data can be processed and stored and then an Enhanced Transmission Control Protocol is used for efficiently transmitting the educational data to the receiver. Also, we employ Elevated Ant Colony Optimization for optimization of the transmission process. This research highlighted existing challenges in sports online education and offered solutions that will aid in the enrichment of online teaching content and the improvement of college professors' teaching quality. According to research on real-time data services, data communication is intrinsically connected to real-time data collection, real-time data management, and real-time data transfer. If communication protocols are used poorly, delays or data loss may result. As a result, it is important to pick the appropriate communication route and protocol. Other equipment are not required for data gathering since devices linked to the 5G Internet and the cloud computing centre complete data exchange through wireless transmission. The paper can be organized in the form, Section 1 introduces the introduction to the effectiveness of English teaching over improving the network performance over information sharing. In contrast, the research report on other existing technologies shown in section 2, Section 3, offers a problem statement, The elaborate description of the suggested technique was illustrated in section 4. Its findings in Section 5 show the feasibility of the proposed method. Eventually, we will review the total concepts results in the final section.

II. RELATED WORKS

[1] here in which hybrid distant education, as well as 5G, should be investigated and tested for the efficacy of teaching When used in conjunction with large data collecting, the technology will allow future learners to have a more realistic learning experience, hence boosting the efficacy of digital deep learning. [2] used FIWARE middleware to handle all entities as part of a bottom-up design and development methodology for a product called 5G Openclasses. A detailed architecture, technology platform, data formats, and end-user applications for 5G Openclasses are presented in this study. In addition, they show how to create a cutting-edge location-based learning service. [3] outlines recent advances in energy-efficient wireless networks and analyses how they could be applied to next-generation cellular systems in the future. Various study findings are described within a framework of energy-efficient resource allocation using optimization as a common technique after examining the trade-off between spectrum efficiency and energy efficiency. After that, possible techniques to enhancing energy efficiency at the physical layer as well as during deployment are presented. Other new technologies including enormous multiple input multiple output, device to device communications and ultra dense networks have unresolved challenges linked to energy efficiency, which have been highlighted as a final result. [4] here the author illustrated the introduction of the 5G era gives a tremendous incentive for VR technology to take off again, since VR technology has been deployed in many industries in China. Higher education will be aided much more by the extensive use of 5G and virtual reality (VR). This study introduces 5G + VR technology to carry out the novel design and teaching application of the course system in light of the challenges and shortcomings of existing Chinese university landscape design teaching methods, such as the Introduction to landscape design course and teaching. The feedback and assessment of the teaching impact was carried out. Results from studies and applications suggest that incorporating 5G + VR into the teaching material and format of landscape design simplifies and enlivens the learning experience for students, while also providing a rich situational learning environment. [5] recommended using 5G cloud computing communication technology to evaluate the variations in students' physical activity behaviour and body composition before and after an experimental mix of instructional reforms integrated multimedia integration. It was decided to use literature-based research methodologies, questionnaires, a teaching experiment, and measurements as well as quantitative data. [6] provide, 5G technology will impact on smart cities, intelligent transportation system. It identifies the critical dimensions and properties of the network class and intelligent city components. Various smart city agility indicators will be reviewed to show its characteristics and what a smart city needs to be shared by 5G networks. Compared to traditional towns, it is carried out besides online indicators of performance indicators and a few smart city initiatives. Savvy tourist, destination wise, a tourist street, and stakeholders' smart needs will focus on better performance. Smart tourism, optimization of resources, sustainable development, has led to the innovative use of technology for the quality of life in good governance and the tourism industry. [7] describes e-sports sector operations according to magnitude, structure, and employment in China nowadays. China's e-sports business will accelerate the merging of offline and urban conventional industries with the help of local industrial policies, and China's e-sports industry will usher in a new round of industrial explosion cycle with the complete promotion and deployment of 5g technology. In the meanwhile, the e-sports industry's future research emphasis will be on e-sports game standards, 5G E-sports mode, professionalized E-sports sports, and E-sports education and culture. [8] One of the goals of this research is to see whether the technical pedagogical knowledge levels and some other factors are good indicators of how well distant education students will do in school. [9] presented a Model-based approach to physical education, which for the first time combined a number of different models. With regard to establishing, interacting with and implementing a multimodal MBP concept, this research addresses the difficult issues front on. Generally speaking, MBP emphasizes the delivery of a model such as cooperative learning, physical education, teaching social responsibility and understanding games. However, many research have looked at how one model is presented, and only a few have looked at hybrid models that combine several models in a meaningful and useful way. [10] here the validity of self-determination theory in physical education was investigated. They used a multilevel structural equation modelling approach to meta-analyze data from 265 notable publications

gathered via extensive study. It was as expected that self-motivation was positively linked to desired outcomes and adversely linked to unwanted outcomes. As a result, intrinsic management has a mixed bag of impacts. External control was negatively correlated with adaptive outcomes, but undesirable outcomes were positively correlated with drive. Students' emotions of competence and autonomy were shown to be more strongly influenced by instructors than by peers in the classroom, while connectedness in physical education was also found to be linked to teacher and peer effects . [11] A potential teaching alternative for sports and physical education teachers and academics, the Constraints-Led Approach (CLA), was presented. This approach has subsequently been put into use. While using the CLA style of teaching and coaching, many academics have shifted their focus to include complexity as well as a more ecological approach. The learner should self-organize in order to identify efficient movement solutions while confronted with multiple limits (task, environment, and performance). According to the CLA, this is required . [12] developed a machine learning and IoT-based physical education system to recognise athletic training attributes and predict actions, as well as to manage physical education and training data. Integrating artificial intelligence (AI) with the Internet of Things (IoT). There are a number of faults that have been solved in the original extreme learning machine via improvement of the hidden layer mapping and optimization algorithms. Data is gathered over time using Internet of Things technology, and an extreme learning machine is used to predict the state of sports training once that data has been processed to a certain degree. Final trials will test the efficacy of the technology. Based on the findings, it seems that this research's suggested physical education and training system may have real-world applications and may be utilised to improve the present system . From a 5G viewpoint, [13] the application of virtual reality technology in physical education has been examined (PE). College general education includes aerobics classes. This study makes use of PE as an example. They conducted their investigation on two freshman classes, one as a control and the other as an experimental group. The experimental class employs VRT to teach aerobics whereas the control class relies on conventional PE instruction and VRT to teach aerobics . [14] researches the current issues in evaluating university and college physical education teaching as well as the associated improved processes. A new assessment index system for physical education is developed in the paper based on the multiple intelligence theory, taking into account teaching, teaching and learning, and management factors in order to improve the current assessment index system for physical education teaching in colleges and universities. Researchers in this study devised a comprehensive system for evaluating college-level physical education instruction using fuzzy logic. The case study section demonstrates the validity of this strategy in an attempt to accurately evaluate physical education courses . Depending on the hybrid technology of data mining and hidden Markov model, [15] investigated in detail the total effect of PE instruction in colleges from the viewpoints of instructors' teaching qualities and students' learning impact. It begins by assessing the current state of college PE curriculum teaching quality assessment; it then examines the applicability of data mining technology and hidden Markov models to university PE teaching quality assessment and proposes a mathematical model for university PE teaching quality assessment; finally, this research runs a series of tests based on mathematical models and thoroughly examines the results. The study's findings show that the model provided in this work may improve the precision with which universities evaluate the quality of physical education training. The study's results provide an insightful look into how computer technology and language teaching may be merged. The study's findings. Both a reference technique and implementation methodology for using machine learning technology to enhance collegiate physical education teaching are presented . [16] mentioned artificial intelligence-based virtual reality technology's role in college PE instruction. It is possible to interpolate the location of the virtual human centre of gravity by using the spline key frame interpolation technique, and the model posture created in each frame is shown to build the virtual person's animations. After synthesising three-dimensional human motion data, the animation may include features like video storage, quick playback, slow playback, and freezing. Virtual human animation and camera video may be shown and played concurrently on one display to provide an understandable comparison of the players' actions . [17] Computing multimedia technology has a considerable impact on the implementation of physical education reforms in universities and colleges because of its support and relevance. When it comes to university and college physical education reform and innovation, we should demonstrate the value of computer multimedia teaching by emphasizing its benefits, building a set of relevant work application concepts, and making full use of its advantages while also demonstrating its increased academic value in related teaching activities. [18] here the most important aspects of multimedia applications are taken into account. This study compares LTE's theoretical performance services to those supplied by 5G, as well as the literature analysis and numerical evaluation findings, to provide a numerical assessment. There is a constant search for better ways to teach pupils, whether it's in K-12 or higher education. Because of the shorter latency, 5G is able to accept (or postpone) the larger volume of data, which is good for VR and other hyper-realistic support experiences. To offer an interface of building blocks required by other developers, support is provided for embedded systems, their language, and culture.[19] in which 5G mobile networks are projected to burst in traffic and adapt to varied 5G deployment demands, as evaluated by suggested Low-Latency Communication Ultra-Reliable (LLCUR) algorithm, which is being tested by several heterogeneous research kinds' networks. This system's key benefit is the ability to execute a virtual network in addition to 5G higher transmission speeds, reduced latency, remote execution, and a larger number of linked devices. [20] in which many heterogeneous network studies have been conducted for the implementation of 5G, particularly for named data networking (NDN). NDN's future network design focuses on content, with name-based forwarding performed via the forwarding information base (FIB) to facilitate communications. An upgraded index known as a bitmap-mapping bloom filter is provided in this study as an unique FIB named B-MaFIB to boost the performance of NDN routers that well handle heterogeneous networks approaching 5G. (B-MBF). [21] isolates the long-term memory network's output values from its hidden layer state values, and vice versa Incorporating an attention module into the brain's long-term memory and short-term memory networks increases both their

output value and their hidden layer state value. Better and more accurate data categorization was accomplished by focusing on the network's short- and long-term memory.

III. PROBLEM STATEMENT

Online teaching is completely dependent on the wired internet and mobile network, so it puts forward strict requirements on network quality, software and hardware operation environment and teaching facilities. As long as bottleneck appears, it will have a serious impact on online teaching, and even make class unable to continue. The large scale and large number of online teaching during the epidemic period caused great pressure on the network environment and online teaching platform, and various network problems. occurred from time to time. According to the feedback of students' questionnaire, the proportion of network affecting class reached 25%, ranking the second in the number of problem feedback. The feedback shows various class problems, including unable to log in, Unable to connect the internet, video stuck, fuzzy video, no voice, and frequent loosing connection and so on. The main reasons for these problems are poor network quality and the overload of the online teaching platform.

IV. PROPOSED WORK

From 2020, the new generation of mobile Internet represented by 5G will be constructed and operated on a large scale in China, which will greatly improve the quality of mobile network environment on which online education depends. It can be predicted that with the gradual promotion of the next generation Internet of IPv6 and the gradual completion of 5G mobile Internet infrastructure, in the next few years, the network problems faced by online teaching will gradually be solved, and the network environment of online teaching will be greatly improved. While developing the network infrastructure, we should promote the construction of software and hardware of online teaching platforms.

We can also continuously upgrade and optimize network servers and other facilities and equipment, improving the system's network concurrency limit and maximum data processing capacity, and actively applying big data, cloud computing, artificial intelligence, VR (Virtual Reality) / AR (Augmented Reality) and other advanced technologies to the online teaching platform to develop new functions and applications. The wide application of these revolutionary new technologies will greatly expand the development space of online teaching, and draw a beautiful blueprint for the future online teaching. In this paper, 5G based physical education teaching method is proposed. The schematic representation of the proposed method is depicted in figure 1.

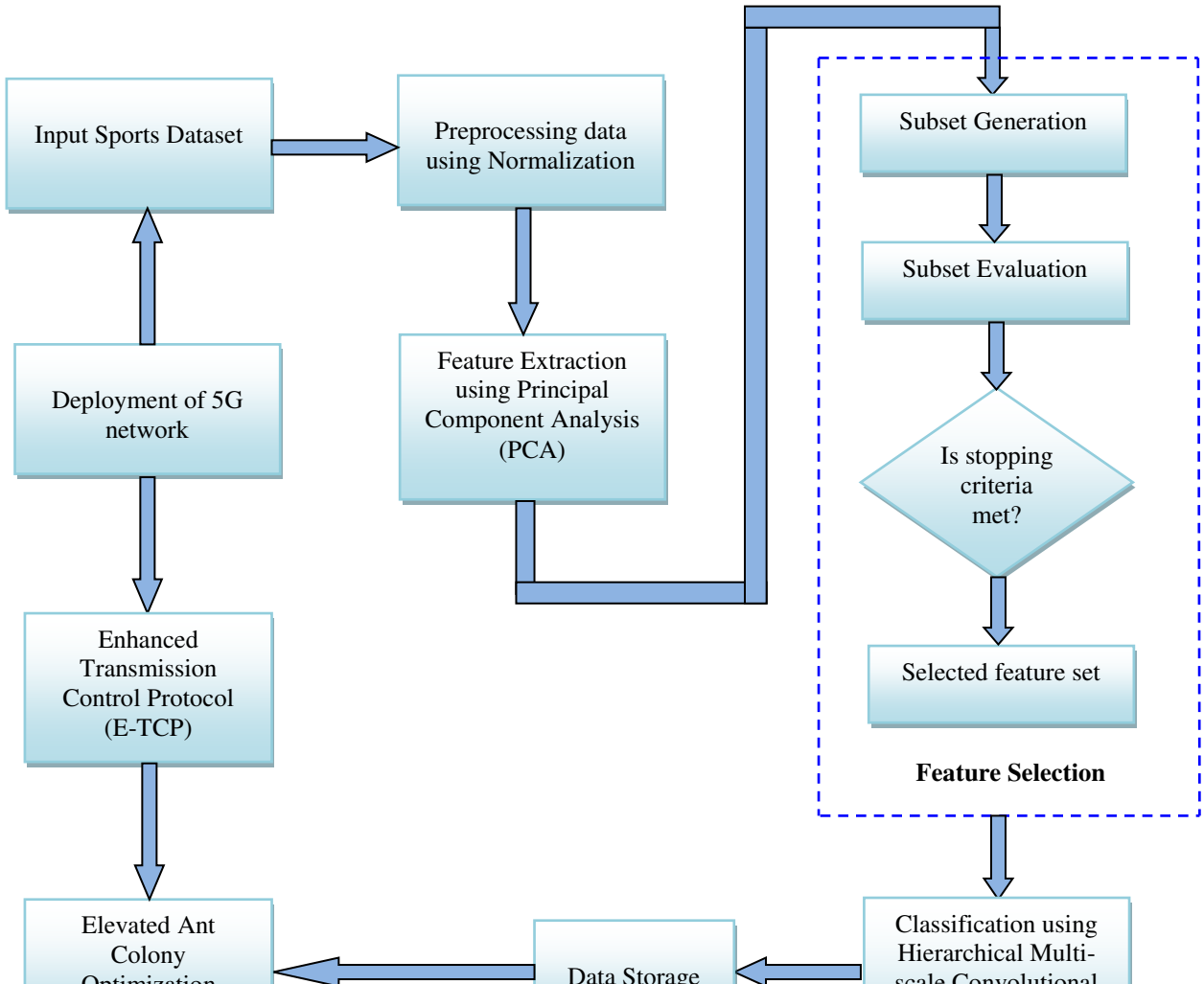
Input Sports Dataset
Preprocessing data using Normalization
Subset Generation
Subset Evaluation
Is stopping criteria met?
Selected feature set
Feature Selection
Feature Extraction using Principal Component Analysis (PCA)
Deployment of 5G network
Enhanced Transmission Control Protocol (E-TCP)
Classification using Hierarchical Multi-
Elevated Ant Colony
Data Storage

Figure 1 Schematic representation of the suggested methodology

A.Dataset

The dataset was obtained from the Chinese university of Hong Kong. Every 5 minutes, eight individuals (four females and four males) engage in one of the 19 activities. Each subject's activity has a 5-minute total signal duration. All the activities were open-ended, so the participants were free to express themselves anyway they wanted. It's because of this that activity velocities and amplitudes differ across individuals. Data is collected at a sampling rate of 25 Hz using sensor units calibrated for that purpose. With a 5-minute signal, 480(=60x8) signal segments may be produced for each activity.

The following are the 19 tasks:

- the act of sitting (A1),
- a position of strength and stability (A2),
- sitting up straight and on the right side of the bed (A3 and A4),
- taking the stairs up and down (A5 and A6),
- taking a seat in an elevator without moving (A7)
- in an elevator, as well as (A8),
- taking a stroll around a car park (A9),
- walking at a pace of 4 km/h on a treadmill (flat and 15 deg inclined) (A1
- the digits 0 and 11),
- working out on a treadmill set at 8 mph (A12),
- using a stair stepper to work out (A13),
- using a cross-trainer for cardio exercise (A14),
- alternating between horizontal and vertical positions when riding an exercise bike (A15 and A16),
- a rowing machine (A17),
- bouncing (A18),
- and participating in basketball games (A19).

Here from the obtained dataset the physical information can be classified before it can undergo transmission process because the information can be merged off.

B.Preprocessing

The preprocessing process aim to remove unwanted systematic variation in the data, therefore we present an approach that utilizes variability to find optimal normalization factor. The data variation can be calculated by calculating the observed data intensity variation,

$$X_{ij} = m_i \times y_{ij}(Z) \times e_{ij,} \qquad (1)$$

Where X, y_{ij} represents the data intensity variation, m,r,e represents the probabilistic constant, i,j represents the error factor, Z represents the normalization factor.

Where,

$$Z = log\ X, \Omega = log\ Z, \mu = \log m, p(\Omega) = \log r\ (Z), \varepsilon = \log e$$

$$Y_{ij} = \mu_i + p_{ij}(\Omega) + \varepsilon_{ij.}$$

$\varepsilon_{ij} \sim N(o, \sigma_i^2)$. (2)

The randomness of the input error,

$$p_{ij} = \sum_s \mu_{is} \left(\Omega_{sj} - \langle \Omega_{s.} \rangle\right) \qquad (3)$$

Where the average $\langle p_{ij} \rangle$ is taken over the samples j=1….M,i.e. $\langle \Omega_{s.} \rangle \equiv \frac{1}{M} \sum_j \Omega_{sj}$.The parameters μ therefore relate the variability of internal standard intensities with the variability of intensities, *i.e.* bigger the parameter μ_{is}, bigger is the contribution of internal standard's *s* variability to the normalization correction factor of error peak *i*.

$$Y_{ij} \sim N\left(\mu_i + p_{ij}, \sigma_i^2\right),$$

$$= \sum_j (Y_{ij} - \mu_i)\left(\Omega_{sj} - \langle \Omega_{s.} \rangle\right) * log\left(\prod_{ij} P(Y_{ij} | \mu_i, p_{ij}, \sigma_i^2)\right) == -\frac{1}{2} \sum_{ij} \left(\log(2\pi\sigma_i^2) + \frac{\left(Y_{ij} - \mu_i - \sum_s \beta_{is}\left(\Omega_{sj} - \langle \Omega_{s.} \rangle\right)\right)^2}{\sigma_i^2} \right) \qquad (4)$$

Where,

$$\mu_i = \frac{1}{M} \sum_j Y_{ij} - \sum_{j,s} \left(\Omega_{sj} - \langle \Omega_{s.} \rangle\right) \qquad (5)$$

$$\sum_j (Y_{ij} - \mu_i)(\Omega_{sj} - \langle \Omega_{s.} \rangle) = \sum_t \beta_{it} (\Omega_{tj} - \langle \Omega_{t.} \rangle)(\Omega_{sj} - \langle \Omega_{s.} \rangle) \quad (6)$$

$$\sigma_i^2 = \frac{1}{M} \sum_j \left(Y_{ij} - \mu_i - \sum_s \beta_{is} (\Omega_{sj} - \langle \Omega_{s.} \rangle) \right)^2 \quad (7)$$

Since $\sum_j \Omega_{sj} \equiv \sum_j \langle \Omega_{s.} \rangle$, the Equation (7) leads to

$$\mu_i = \langle Y_i. \rangle * \Xi_{is} \quad (8)$$

Where,

$$\Xi_{is} = \sum_t \beta_{it} \sum ts, \quad (9)$$

The equation can be rewritten as,

$$\Xi_{is} = \hat{\beta} \sum_j (Y_{ij} - \langle Y_i. \rangle)(\Omega_{sj} - \langle \Omega_{s.} \rangle) \quad (10)$$

$$\Xi_{ts} = \hat{\beta} \sum_j (\Omega_{tj} - \langle \Omega_{t.} \rangle)(\Omega_{sj} - \langle \Omega_{s.} \rangle) \quad (11)$$

Where $\hat{\beta}$ is the error eliminating factor.

$$\hat{\beta} \equiv \hat{\Xi} \times \Sigma^{-1} \quad (12)$$

The hat matrix can be calculated by using the formula,

$$\tilde{X}_{ij} = \hat{\beta} X_{ij} \times exp - \sum_{s=1}^{s} \hat{\beta}_{is} (\Omega_{sj} - \langle \Omega_{s.} \rangle)$$

$$* \left(\frac{(\prod_{k=1}^{M} Z_{1K})^{\frac{1}{M}}}{Z_{1j}} \right)^{\frac{r_{i1}}{\sigma_i^2}} \quad (13)$$

The updated normalized function can be represented us,

$$r_{i1} = \sigma_i^2 \sum_{j=1}^{M} (\log X_{ij} - \langle \log X_i \rangle)(\log Z_{1j} - \langle \log z_{1.} \rangle) \quad (14)$$

Where,

$$\sigma_i^2 = \sum_{j=1}^{M} (\log Z_{1j} - \langle \log z_{1.} \rangle)^2.$$

C.Feature Extraction

Here different subjects are there in the physical education. Depend upon the content the features can be extracted. The PCA may be used to choose the features. Statistical texture properties of second order may be extracted using the PCA. Third- and higher-order textures make advantage of the interaction between three or more data pixels and have been employed in a variety of applications. As an arithmetic function the PCA usually removes unwanted features . It's easy to see the difference between the specialized and the unwanted features. For the sake of analysis, the data may be panned out. PCA can define the frequency of data in a certain accurate differential region. The single pointed feature will be scrutinized in this case, together with unwanted features known as the l-feature and the unwanted detachment. When m gets a single value, may then be used to delete properties from data that were previously processed . The detachment process can be,

$$Detachment = D \oplus V \quad (15)$$

For the getting of the new value we need to subtract the detachment value that can be illustrated as,

$$E\theta A =_{A(i,j)}^{\wedge} [E(x+i, y+j) - B(i,j) + 1]$$

$$-A_{(i,j)} [D(x+i, y+j) - B(i,j) - 1] \quad (16)$$

After the process of the subtraction the new Eigen covariance matrix was obtained,

$$V_N V - \bar{V} = a_1 u_1 + a_2 u_2 + a_3 u_3 + \cdots . + a_N u_N \quad (17)$$

Where V represents the Eigen values. The obtained symmetric feature matrix is in the form of,

$$\hat{V} - \bar{V} = \sum_{i=0}^{1} a_1 u_1; 1 < N * d(a,b) \quad (18)$$

Where $d(a,b) = \sum_{i=1}^{n} |bi - ai$

Finally the subject related features are selected .

D.Classification

Learning and classifying physical education content using Convolutional Neural Networks (CNN) models. Here Hierarchical Multi-scale CNN can be used for the purpose of the classification. As a result of feature extraction, the educational content requires differentiation into different games or work practice. This categorization was performed using HMCNN, which

is a well-known technique. The goal is ranked based on the likelihood that it will occur. It is a pre-trained convolution algorithm. A single dependent variable and one or more independent variables may both be analyzed using HMCNN. With the help of the HMCNN, probabilities are estimated and a function is applied. The data is compiled at the group level. HMCNN can read and resize the picture first, and then perform the classification process by computing the probability of its class. For that the smoother activation function can be calculated using,

$$g_{Sact}(y) = \frac{y}{1+e^{-\alpha y}} \quad (19)$$

$$\alpha \geq 0, g_{Sact}$$
$$\alpha \to \infty, g_{Sact}$$

Where α is the important parameter learned during the training process.

The extracted features can be converted into vectors for the process of the pooling,

$$B_j = vec(B_{j-1}) = \frac{1}{M \times M} \sum_{i=0}^{M \times M} F_i \quad (20)$$

$$B_j = vec = af \sum_{i=0}^{M \times M} w_i F_i \quad (21)$$

$$a = f_{\emptyset}(y)$$
$$f = a \odot z$$

Where a is the pointed vectors, f is the specialized parameters.

Formally, the attention mechanism provides a neural network with the capacity to concentrate on a subset of the feature vectors by varying their weights accordingly. If we consider $a = f_{\emptyset}(y)$, $f = a \odot z$ are the input vector, which can be a feature map, which can be an attention vector and a network of attention with parameters can be illustrated as,

$$B = -\frac{1}{n} \sum_{i=1}^{n} \sum_{k=1}^{C} 1(z_{ik} = k) \ln \left(\frac{exp\left(\left(w_k^{out}\right)^T h_k^{out} \right)}{\sum_{j=1}^{C} exp\left(\left(w_j^{out}\right)^T h_j^{out} \right)} \right) \quad (22)$$

A feature map in the HMCNN model may use this technique to improve its accuracy and efficiency. Assume the input feature map is N in size, with C denoting the 2D map size and C being the number of channels on the map.For the first step, the attention module uses two successive convolutional layers to shrink the feature map to a size of N-1. A locallyConneced2D layer is then used to train N weights, followed by a sigmoid activation function. Next, the weights are replicated over the channel dimension C times using another convolutional layer. Here, it's vital to keep in mind that a linear activation function follows this layer, meaning the weights may take on a broad range of values. Nevertheless, after dividing the new feature map's weight by the average weight vector, we scale the result by a factor of C. As a result, the final operation acts like a weighted average, with values that are equivalent in magnitude to the original feature vectors. Finally the classified weighed values can be in the form of,

$$B = \gamma_1 B_1 + \gamma_2 B_2 \quad (23)$$

The equation can be rewritten as,

$$B = \gamma_1 \left(B_1 + \frac{\gamma_2}{\gamma_1} B_2 \right) \quad (24)$$

Where,

$$\gamma = \frac{\gamma_2}{\gamma_1} \quad (25)$$

As a result of the classification the different physical education subjects gets classified. Then it can be securely stored in the cloud for further transmission process.

E.5G network deployment

A 5G wireless network architecture that randomly disperses and immobilises all SN and some gateways is investigated. If the contact range of the sensor nodes is within the range of the sensor nodes, sensor nodes will be assigned to each gateway. As a result, sensor nodes may be allocated to certain gates in advance. Each sensor node has its own list since there are only a certain amount of portals that may be shared between them. Similar to the DSR research technique, the data collection process is broken down into rounds. Both SNs collect data from the nearby region and transmit it to the appropriate CH throughout each round (i.e., the gateway). The data gates delete obsolete and uncorrelated data before transferring it to the base station by employing another CH as a next hop relay node. The two nodes disconnect from the network after two rounds of shutting off their power-saving communicators to save energy. Everyone gets access to the internet through 5G wireless technology. Despite such near proximity, the nodes are still linked wirelessly.

F.5G optimized data Transmission

We suggest the use of optimized code to enhance transmission quality since the worsening of transmission quality of individual subflows might have a substantial influence on Elevated Ant Colony Optimization based Enhanced Transmission Control

Protocol overall goodput. Because it can dynamically adjust its compression rate in response to the receiving quality, the rate less optimized algorithm outperforms fixed-rate compression. In this part, we first discuss the fundamental architecture of our proposed EACOBETCP. Data is encoded and sent in numerous directions using the optimized code, which is introduced into the transport layer. The data allocation module is added on top of the encoding module, which receives a byte stream from the programmes as input. This is followed by the encoding of each block, which results in a sequence of encoded symbols being transported in packets and sent to the recipient. A decoding module is added to the data aggregation module on the receiver side to transform encoded symbols back to the original data.. Decoded data may be sent to the application layer and the matching symbols can be purged from the receiving buffer before being transferred. The sender must produce encoded symbols from the pending blocks and assemble these symbols into a packet for the subflow when it receives a transmission opportunity. The receiver will aggregate the symbols from distinct subflows after extracting the encoded symbols from the packets. If the received symbols are sufficient to recover a block, the decoding module may use them. For this we can start the process of optimizing the codes of the TCP protocol by using the Elevated Ant Colony Optimization Algorithm. The optimized parameters for the ant colony optimization algorithm can be illustrated as,

$$A_{min} = 2 * \sum_{i=1}^{n} AW_i * max_{1 \le i \le n} RTT_i \quad (26)$$

The optimized parameters for the elevated ant colony optimization algorithm can be illustrated as,

$$EA_{min} = \sum_{i=1}^{n} AW_i * (max_{1 \le i \le n} RTT_i + max_{1 \le i \le n} RTO_i) \quad (27)$$

By using the elevated parameters the buffer size for the sender and the receiver can be minimized by using the following equation,

$$d_n = \left(\sum_{k=1}^{\hat{k}_a} q_k . g_{nk}\right) mod2 \quad (28)$$

Where $n = by - \hat{k}_a(g_{nk})'s$

In our suggested protocol we used some optimized codes which are rate less which was based on the EACO that can be represented as,

$$\partial_a(l_a) = \sum_{j > l_a} \binom{\hat{w}_f + l_a}{j} q_f^i (1 - q_f)^{\hat{w}_f + l_a - j} \quad (29)$$

The probability of the coding failure can be illustrated as,

$$P = q_f^j (1 - q_f)^{\hat{w}_f + l_a - j} \quad (30)$$

Where $q_f = \binom{\hat{w}_f + l_a}{j} p_f^j (1 - q_f)^{\hat{w}_f + l_a - j}$

$$j > l_a$$

$$p_f = \frac{\hat{k}_a + l_a}{k_a} \quad (31)$$

The probability of the packet loss can be defined by using the equation,

$$EDT_f = \sum_{j=0}^{\infty} q_f^j (1 - q_f) j RTO_f + DT_f$$

$$= \frac{q_f RTO_f}{1 - q_f} + DT_f * \quad (32)$$

The expected arriving time of the packet (RTT_f) can be demonstrated as,

$$RTT_f = (1 - q_f)\, RTT_f + q_f RTO_f \quad (33)$$

The sub flow for the packet can be calculated as step by step,

$$EAT_f = \begin{cases} EDT_f, & if\ w_f > 0 \\ EDT_f + RT_f - T_f, & otherwise \end{cases} \quad (34)$$

$$EAT_f = EDT_k + RT_k - T_k < EAT_j$$

$$EDT_1 < EDT_2 < \cdots < EDT_{n+1}$$

$$PEDT_2 < PEDT_3 < \cdots < PEDT_{n+1}$$

$$PEDT_1 = (1 - q_2)\frac{r_2}{2} + q_2(R_2 + EDT_1) \quad (35)$$

$$= (1 - q_2)\left(\frac{r_2}{2} + \frac{q_2 R_2}{1 - q_2}\right) + q_2(R_2 + EDT_1)$$

$$= (1 - q_2) EDT_2 + q_2 EDT_1$$

$$PEDT_2 > EDT_1$$

$$PEDT_1 < PEDT_2$$

$$EDT_2/EDT_1$$
$$m > \frac{3-q_1}{1+q_1}$$

$$PEDT_2 = \frac{q_2 R_2}{1-q_2} + \frac{r_2}{2} \approx \frac{1+q_2}{2(1-q_2)} r_2 \quad (36)$$

$$EAT_1 < EDT_1 + RT_1 - T_1$$
$$< EDT_1 + R_1$$
$$\approx \frac{EDT_2}{m} + r_1$$
$$EAT_f < PEDT_2$$

The optimized sub flow can be calculated,

$$\frac{E(T_2)}{E(T_1)} \leq q_2 \frac{3-q_1}{1+q_1} + (1-q_2)m \quad (37)$$

Then finally the best fitness path can be identified by using the below equation,

$$E(T_2) = (1-q_2)\frac{r_2}{2} + q_2(R_2 + E(T_1) + E(RT_1 - T_1))$$

$$\leq (1-q_2)\frac{r_2}{2} + q_2(R_2 + E(T_1) + R_1) \quad (38)$$

$$E(T_2) = m = PEDT_2/PEDT_1 \approx \frac{(1+q_2)(1-q_1)r_2}{(1-q_1)(1-q_2)r_1} \quad (39)$$

The elected optimized path transmission process can be represented as,

$$E_{TX}(k,c) = E_{elec} * k + \epsilon_{OPT} * k * d^2 \quad if \;\; d < d_0$$
$$E_{elec} * k + \epsilon_{OPT} * k * d^4 \quad if \;\; d \geq d_0$$
$$E_{RX}(k) = E_{elec} * k$$

Finally the data can be securely transmitted with in a limited period of time.

Algorithm: 1 (EACOBETCP)

Input: Classified output

Output: Data transmission

Initialize all the parameters. jfd

$$. B = -\frac{1}{n}\sum_{i=1}^{n}\sum_{k=1}^{C} 1(z_{ik} = k) \ln\left(\frac{exp\left(\left(w_k^{out}\right)^T h_k^{out}\right)}{\sum_{j=1}^{C} exp\left(\left(w_j^{out}\right)^T h_j^{out}\right)}\right)$$

Feature map analysis,B

Classified data(flag)

Train,test data (70,30)

$$B = \gamma_1\left(B_1 + \frac{\gamma_2}{\gamma_1} B_2\right)$$

For

End

Data transmission process

If (Node. energy $<$ 0)

Set Node.status = dead

Else

Set Node.status = alive

return

Randomly select cluster head nodes with Node.Status = alive

Optimization code

Eleveated ant code

End

(Node[i].flag = 0) /∗transmission node.

Send the data packet from node to cluster head.

else

Set (Node[$m-1$].flag = 1) // $m-1$

Send the data packet received by the cluster head to the base station.

return

End
End

V. PERFORMANCE ANALYSIS

This section demonstrates the suggested technique's effectiveness. Many online education applications, high-capacity, but it can accommodate concealed, anti-jamming wireless networks serve an important function and it was stated that future orders would not need the same high data rate communications. Low Latency Communication and Ultra-Reliable Communication are two key features of the proposed approach. 5G can provide up to 20 gigabits per second and a peak data throughput of 100 megabits per second (Gbps). While 4G's average and peak data rates are also 100 megabits per second, this is light years ahead of that (gbp). It is proposed in this study that a new data packet processing architecture be developed based on a combined simulation scheme of optimization technologies in order to enhance the platform's capacity to scale.

Table 1 Simulation specifications of the suggested system

Parameters	values
Energy transmission	100 m
Energy sampling	20
Energy amplitude	0.0128 m
Energy aggregate	8 kWh
Number of packets	Random of 15-20
Square area size	1000*1000 m^2
Velocity	[15,40] m/s

Here in which the input data can be preprocessed and it can be
Classified depend upon the extracted depend upon the features to be extracted. The physical education content was classified by using the HCNN procedure. The performance of the suggested classifier can be analyzed by comparing it with some existing methodologies [21]. For the purpose of evaluating the classifier model's performance in its whole, this article employs the following six indicators: precision; recall; F1 Score; ROC; and AUC. Deep learning algorithms have long relied on these metrics for evaluation. This research provides a more extensive categorization impact expression to help readers better comprehend the findings.
Below is the mathematical expression for the given index.

$$Accuracy = \frac{True\ Positive + True\ Negative}{True\ Positive + False\ Negative + False\ Positive + True\ Negative} \quad (40)$$

$$Precision = \frac{True\ Positive}{True\ Positive + False\ Positive} \quad (41)$$

$$Recall = \frac{True\ Positive}{True\ Positive + False\ Negative} \quad (42)$$

$$F_1 = \frac{2 * Precision * Recall}{Precision + Recall} \quad (43)$$

$$TPR = \frac{True\ Positive}{True\ Positive + False\ Negative} \quad (44)$$

$$FPR = \frac{False\ Postive}{False\ Positive + True\ Negative} \quad (45)$$

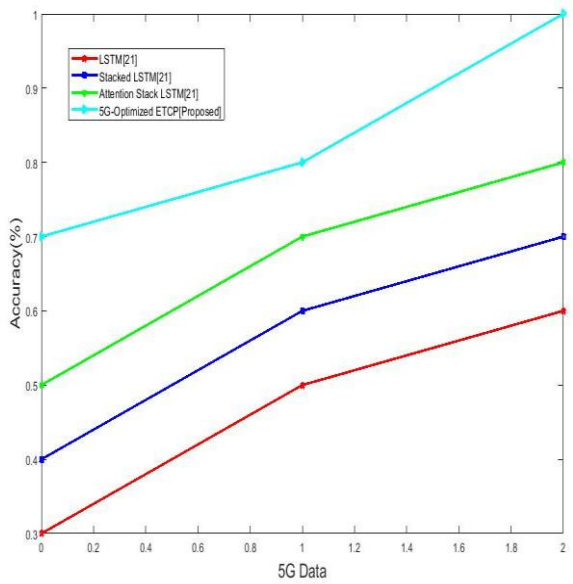

Figure 2 5G data Vs. Accuracy

Figure 2 shows the proposed classification method, showing a maximum accuracy yield of 99.8%, which is better than conventional methods

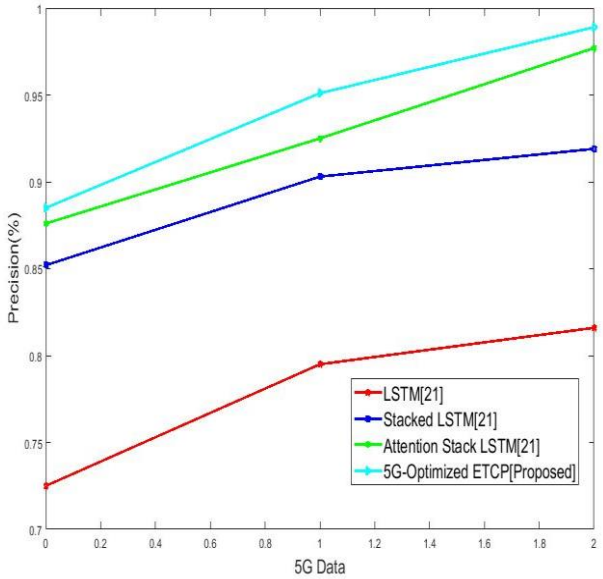

Figure 3 5G data Vs. Precision

Figure 3 shows the proposed classification method, showing a maximum precision yield of 98%, which is better than conventional methods

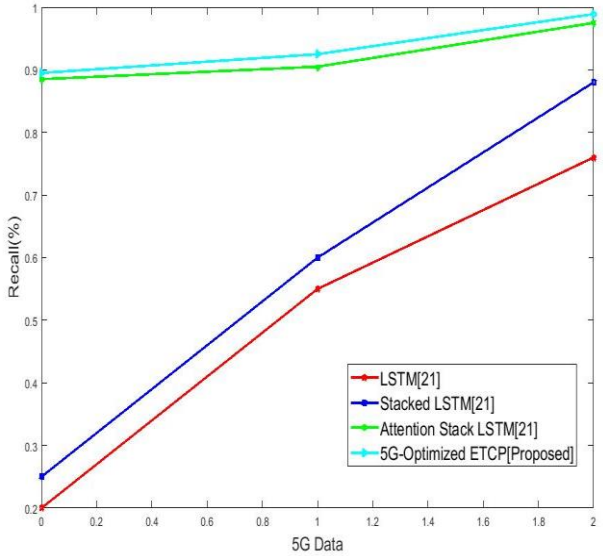

Figure 4 5G data Vs. Recall

Figure 4 shows the proposed classification method, showing a maximum recall yield of 98%, which is better than conventional methods. To prove the efficiency of the suggested 5G optimized TCP network data transmission it can be compared with some other existing methodologies [18], [19] and [20].

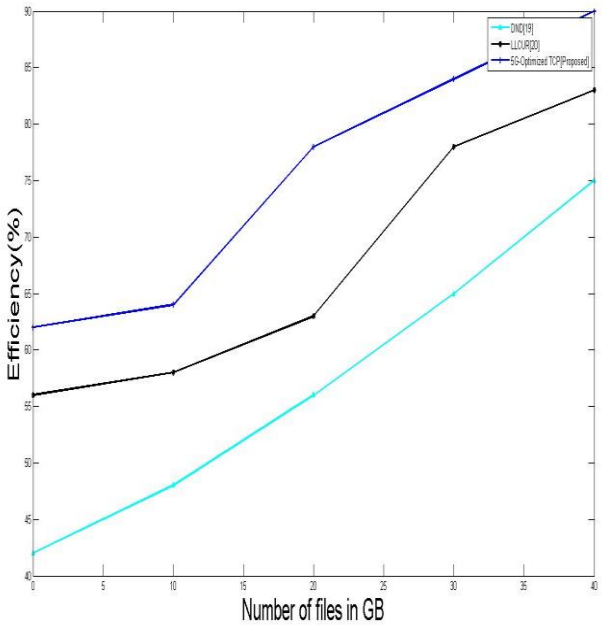

Figure 5 Number of files Vs. Efficiency

However, the attack surface will be expanded because to the large number of connected devices and network virtualization technologies used in the core infrastructure. A mistake or malicious software might bring down the whole network putting the entire civilization at risk. As can be seen in the graph below, 5G's data transmission efficiency is higher than 4G. Briefly summarised, the demonstration aims to show how flexible 5G network and infrastructure scheduling may be. The recommended approach has a 90% success rate. Similarly, DND and LLCUR yield 72 and 85 percent, respectively, in the prior techniques.

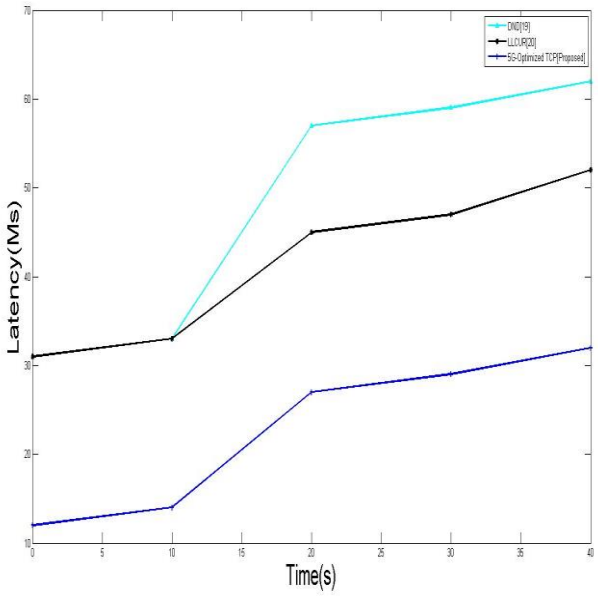

Figure 6 Time Vs. latency

When compared to the other methodology 5G optimized TCP methodology shows less latency over network.

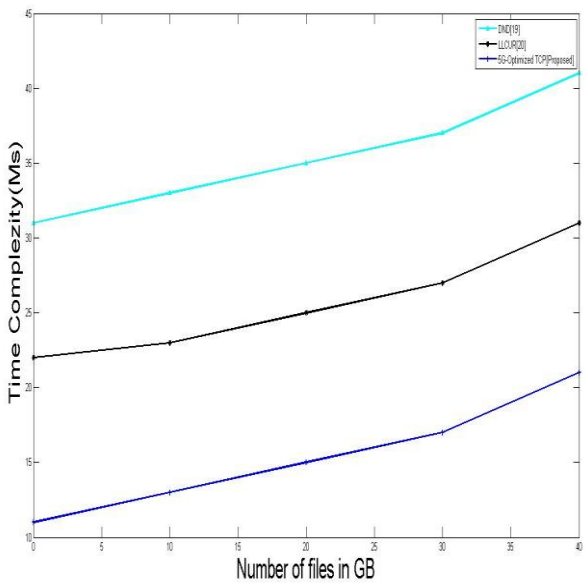

Figure 7 Number of files Vs. Time complexity

Figure 5 shows the results of a study on temporal complexity. The proposed method takes 38 milliseconds to complete. Data Named Design (DND), (LLCUR) generates 42ms, 44ms using existing techniques. The proposed system is less time-consuming than other existing ones. The overall performance of the proposed 5G system was depicted in table 1.

Table 1 Performance of the suggested data transmission

Number of terminals	Number of successful packets	Packets transmission success rate/%	Simulation run time

10	1000	100	13.6
50	2000	99.8	25
100	3500	89.9	61.7
500	5000	85.5	85.5
1000	5500	78.6	120
5000	5200	68.5	248

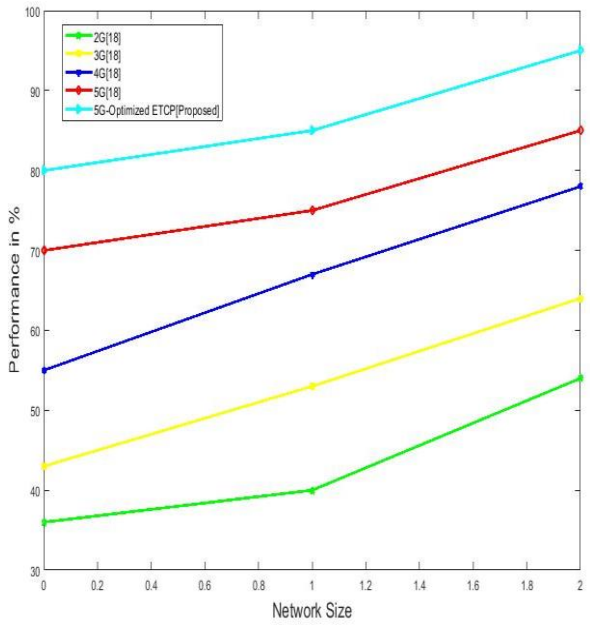

Figure 8 Network size Vs. Performance

Figure 8 suggests the performance of the suggested network over data transmission. The proposed protocol have high range of data transmission rate than other conventional methodologies

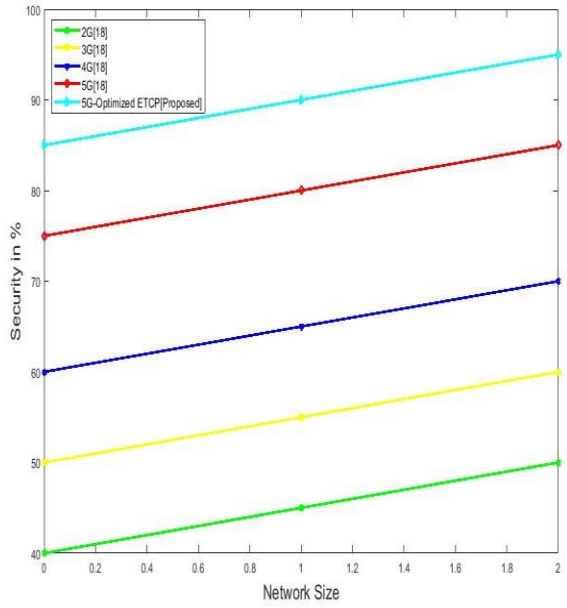

Figure 9 Network size Vs. security

Figure 9 suggests the performance of the suggested network over data transmission security. The proposed protocol have high range of data transmission security rate which is higher than other conventional methodologies

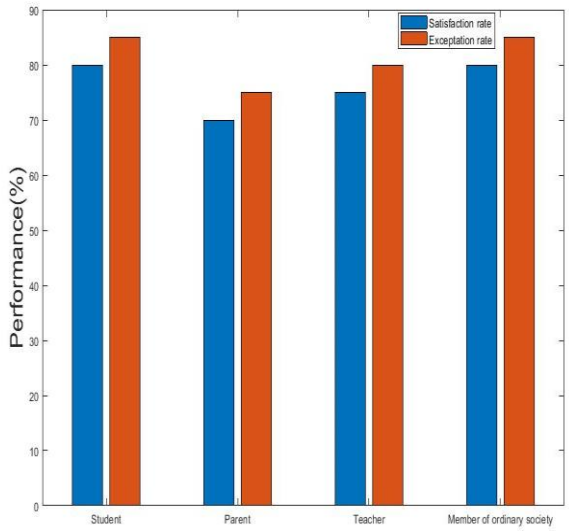

Figure 10 Suggested 5G performance and satisfaction analysis

It's clear from Figure 10 that the existing physical education platform doesn't satisfy many individuals, particularly the average citizen. It's because network data transmission is too sluggish, efficient, and time-consuming; the arrival of 5G platforms is extremely high in value predicted. Therefore over the suggested 5G mechanism the satisfaction rate was approximately up to the expectation Rate. Hence the implementation of the suggested 5G Optimized –ETP have better future in the communication and data transmission system.

VI. CONCLUSION

When it comes to 5G physical education information platform design, this study shows that the majority of people are eagerly anticipating its arrival. Online communication for basketball instructional purposes is being established over a 5G network. The 5G network will take off and be impossible to ignore as mobile communications capacity increases. This increases the speed at which data may be sent and offers up a world of new commercial and educational possibilities. Also, the use of a 5G network for Low-Latency Communication has a positive impact on everyday life. Five-generation networks (or 5G) will have a number of unique characteristics, including the ability to distribute services and management algorithms quickly, operate autonomously, and use resources more efficiently during online training. Developing educational information system requirements required just a short time from concept to implementation since there were few comparable systems available for comparison and because the demands of users and process connections were not well defined. Network speed is 98%, data transfer efficiency is 90%, and time complexity is 38% when using the provided approach..

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