

# The Impact of the Development of 5g Technologies on the Ideological and Political Education of College Students

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## Research Article

**Keywords:** Ideological and Political education (IPE), Fifth Generation (5G), Normalization, Hierarchical K-means technique (HK), Boosted TCP protocol (BTCP), Enhanced fruit fly optimization (EFFO)

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# Abstract

Poor teaching effectiveness is currently a major concern at China's colleges and universities. The 5G Internet age has delivered massive advancements to lifestyle, culture, and work, and its convenience and efficacy have aided civilization's express advancement. It has brought with it a host of difficulties, as well as new changes and benefits for university students' ideological and political education (IPE). However, the Internet's openness and dispersion have certain negative repercussions, especially in terms of IPE in institutions, where the consequences are significant. In this paper, we have proposed a 5G-based IPE. In the opening, we collect the dataset to initialize the proposed flow. The collected dataset can be pre-processed using normalization. After the input education details have been preprocessed, the education detail is grouped by utilizing the Hierarchical K-means technique. The aspects can then be extracted using the variational autoencoder (VAE). After it has been reviewed for viability, the data can be stored in a database for future research. Then, using the Boosted TCP protocol (BTCP), the workable data can be sent to the identity of the student, and also the BTCP used to convert data effectively. The presentation of this protocol improved using Enhanced fruit fly optimization (EFFO). Performances such as throughput, good-put, transmission rate, and execution time are examined, and the results are compared to those of other studies.

## I. Introduction

The Internet has increasingly invaded many elements of politics and social life nowadays, thanks to an express growth of IT, digitalized technologies, and Android conveying technologies. It has grown into a vital field that is intimately linked to the country's destiny in the age of digital technology. The Net, for instance, has infiltrated each class, each dormitory, as well as every college student's everyday study, and college students have emerged as its most aggressive group in terms of incorporating new technology into their regular living. Through modern media, university graduates gain a significant quantity of knowledge and information, which has an impact on their strategy of living, studying, and reasoning. Students' IPE opens up new possibilities while also posing significant problems [1]. One of the characteristics of modern civilization is that it is rich in information, and the rate at which information is transmitted and renewed is increasing. In these circumstances, the priority is to ask ideological and political education to change traditional to simply explain and introduce basic theory inculcating model, efficient use of network advantage, various theories and messages quickly passed on to ideological and political education of the educated, faster and better to implant educated spirit of independent learning, so that they can improve their ideologies [2]. Teachers can create course-specific multimedia curricula and submit them to digital lectures on the net. Graduates can study at every time by browsing online; if they don't understand something, they can leave a message on a BBS in SMS or audio that isn't in live time. To more quickly identify the effects of teaching and learning, Digital examinations are also conceivable in digital learning, with professors being able to escape pertinent exercises online and students being able to practice and keep track of their progress. It also can control user roles and permissions. Colleges and universities are increasingly adopting this type of integrated "network online

course" [3]. The range, timeliness, interaction, and breadth of the computer network can enhance traditional education and provide IPE in colleges and universities a new lease on life. That use of a computer network in conjunction with traditional teaching methods can help to enhance the relevance and authenticity of IPE. So this paper approaches 5G-based IPE for analyzing the performance parameters that are compared with existing methods. Now in this article, the collected dataset can be pre-processed using normalization. After the input education details have been preprocessed, the educational information is grouped using the Hierarchical K-means technique. The features can then be extracted using the variational autoencoder (VAE). After it has been reviewed for viability, the data can be stored in a database for future research. Then, using the Boosted TCP protocol (BTCP), the workable data can be sent to the identity of the student. This protocol is used to convert data effectively. The presentation of this protocol improved using Enhanced fruit fly optimization (EFO). Performances such as throughput, good-put, transmission rate, and execution time are examined, and the results are compared to those of other studies. The result can be examined in the MATLAB Simulation software tool. The further part of this article is structured as shown. Section II offers the literary works associated with this paper and the problem statement. Section III explains the presented model. Section IV provides the performance analysis of the suggested method. And, finally, section V contains the overall idea of the paper.

## II. Related Works

Based on the reform of the studying field curriculum system of ideological and political education courses in colleges and universities, **Xiaoyang et.al (2021)** [4] propose using association rules between data mining and artificial intelligence technology to mine the engagement between the software higher studies of the computer department, and ideas and methods for optimizing the course setting. It proposes four techniques of "systematic design as described in the outline, collaborative team-building coordination, ecological network growth, and dual development of quality standards," as well as improvements and optimization tactics. Countermeasures that will help you be more effective.

**Wang et.al (2020)** [5], examine Artificial intelligence-based teaching intelligent machines, summarize their functions and characteristics, and conclude that a mobile Artificial intelligence terminal-based ideological and political teaching system for university students could be used as an educational leader, assistant, or even a teaching object to guide students' studying.

**Yi et.al (2020)** [6], provide an overview and reflection on current ideological and political education in China, discusses the practical importance of cultivating students' cultural self-confidence through curriculum design, examines the relationship between college English curriculum design and ideological and political education, and proposes a path planning to improve the relationship.

Related to psychological performance measures, **Zhong et.al (2021)** [7] propose AI-IPL for university graduates. The AI-IPL approach is used to support college students' mental and physical development, as well as their ideological and political development. The AI-IPL approach causes disagreements among

certain students, determining the IPL of a person's ultimate proclivity for creative strategy and psychology education technique.

**Wang et.al (2019)** [8], concentrates on both political and ideological educational workers in enhancing information understanding, viewpoint, understanding fully big data analytical techniques, making preparations for the digital revolution, fondling in the political and ideological education of law, and enhancing the efficiency of Political and ideological teaching at the advertise educational status, among other things.

**Shiyang et.al (2019)** [9], mutually cooperates, fuse, and penetrate through the Ideological and Political Theory Lesson Classroom Theory Teaching, Research Teaching, Experiment Teaching, Practical Teaching, Network Teaching, and so on. Teachers and students participate in the Ideological and Political Theory Course's Omni-Directional Teaching Activities, which strengthen theory education, research education, practice education, and network education. Jsp is becoming more widely used in all types of Jsp applications as a good dynamic web page development language. For the Most Common Jsp Programs, the Combination of Jsp Javabeen Has Become the De Facto Standard.

In **Zheng et.al (2021)** [10], students' knowledge of national security and national crisis grows as a result of the effective integration of IPE into the syllabus, and they understand that if they fall behind, they will be defeated. They should take risks and study hard so that they can be enthusiastic about their professional knowledge and abilities. Furthermore, while mastering their skills and knowledge, they get a comprehensive awareness of information security industry rules and specifications moral duty, enhancing students' ability to address real-world information security challenges.

**Zhang et.al (2021)** [11], utilizes a software architectural model based on the typical Android environment, which mixes two architectures. Java program has been chosen as a technique for constructing net educational structures for later efforts & service updates as a result of comparative research on networking technology today. To enable education between teachers and students, the underlying network education technology utilizes APP. This technology can encompass the latest learning style in which students and faculty are the key players, in addition to utilizing computers' advantages in net information transport. By simulating the genuine school and educational process and applying a range of useful education management strategies, it may handle some challenges in teacher and student education as well as educate teachers and students.

**Zheng (2021)** [12] designs a Tai Chi political and ideological interactive classroom system using advanced analytics and graphing neural nets. To initiate, a Spatio-temporal chart CNN is used to logic about the connection between Tai Chi action subgroups and to boost the lesser features of sub-sets and their cross expressions, which are used to improve the semantic augmentation of current input images. Furthermore, to ensure the Tai Chi scene analysis network's efficacy, an efficient dual feature extraction basic module is introduced to establish the backbone network, reducing the number of parameters and the overall network's computational complexity.

**Hong et.al (2021)** [13], presents a strategy for detecting unusual access patterns in IP-MOOCs in institutions. The model for detecting net activities is built using DL to distinguish between normal and abnormal network behavior to detect anomalous access network behavior.

**Zhou et.al (2021)** [14], provide a syllabus IPE platform that integrates various data and details in a connected world. This study employs the MVC framework, which makes it simple to construct numerous controllers in a web app built using the MVC design pattern. The front desk IPE teacher section is where the login mechanism is located. The teacher can also check the test status of a specific student as well as the overall IQ of all students who have been tested. There are 3 sorts of user logins in this system: administrator, student, and instructor, each of which can be accessed using the user passcode. Teachers can participate in these activities by questioning students' exam situations, paying attention to students' many bits of intelligence, and instructing students according to their abilities.

The rise of information technology and innovations has aided in the implementation of the flipped classroom practically and efficiently. It flips information transfer and internalization from two levels of teaching structure and teaching method, reversing the standard teaching information exchange in class and information deepening after class from time and location. This research **Su, F. and Fan, Z. (2021)** [15], introduces a new recurrent neural network method for music feature categorization that includes a channel attention mechanism.

In **Men, C. (2021)** [16], with the arrival of the digital age and the continuous growth of the tech field, the previous approach of IPE at colleges has become outdated, making it necessary and urgent to employ the Web to educate. However, the enhancement of instructional procedures in colleges is currently beset by a slew of challenges and inconsistencies. The unpredictability and formalization of net data are all issues that must be addressed. As a result, relevant departments at universities must fundamentally overhaul ideological and political education to legitimize the latest style of relationship among students and instructors

**Yang, Y. (2021)** [17], employs a data flow intrusion detection system to track virtual learning visits, detect malicious nodes and abnormal entry in real-time, and respond to changes occurring in network visitation patterns. First, normal and atypical visitation modes are used to build a knowledge library. Second, the similarity between normal and abnormal modes is measured using the variance among the information point and information group. Finally, to reflect network modifications in the virtual quality education, the data collection is re-clustered. The proposed method is put to the test using a real dataset.

In **Hornsey et.al (2021)** [18], considers some limitations, the unique analyses presented here offer new insight into who in the public is most likely to be vaccination skeptical. Profile 1 depicts a small group of educated, left-wing individuals who are adamantly opposed to vaccinations. Profile 2 depicts a broad coalition of people from various walks of life, connected by youth, political fanaticism, and a lack of educational attainment.

## iii. Proposed Work

The framework for assessing educational systems and providing ideological instruction to college students is offered. Here is where you may start the 5G network. In the first step, we collect the dataset to initialize the proposed flow. The collected dataset can be pre-processed using normalization. After the input education details have been preprocessed, the education data is grouped by utilizing the Hierarchical K-means technique. The aspects can then be removed using the variational autoencoder (VAE). After it has been reviewed for viability, the data can be stored in a database for future research. Then, using the Boosted TCP protocol (BTCP), the workable data can be sent to the identity of the student also BTCP is used to convert data effectively. The presentation of this protocol improved using Enhanced fruit fly optimization (EFFO). The performances such as throughput, good-put, transmission rate, and execution time are analyzed and then the result is compared with existing methods. The proposed structure flow is represented in Fig. 1.

### 5G Network Setup:

While 5G networks and verification testing is now underway, the introduction of commercial 5G network services will necessitate the supply of monitoring solutions at 5G networks I&M to ensure IPE performance. As a result, we must establish up an efficient 5g network for data goodness transmission.

### Dataset Collection:

This article selects 55 quantifiable formative evaluation forms for counselors' use, with each form containing mostly two criteria. The majority of it is made up of management attitude and capability. Handle individual learners fairly; cultivate a positive relationship with the students; speak respectfully and model behavior; be truthful and self-disciplined. Students act unfairly and selfishly at work; Students act unfairly and selfishly at work.

### Data pre-processing using Normalization:

The information is unstructured and may contain identical packages or incomplete data. It has been thoroughly cleaned and processed to remove identical and repeating instances, as well as invalid information. Because the educational system's databases are so large, sample reduction techniques must be used. Extracting aspects approaches are required to reduce unnecessary characteristics due to the vast number of features in this dataset. During the pre-processing stage, the data may be normalized. The s-score, which is defined by the equation, is generated in the first stage of the normalization procedure (1).

$$E = [(S_m - \alpha)/\nu] (1)$$

Where  $\alpha$  is defined as mean data

$\tau$  – Standard

Further, equation (1) is given as,

$$E = \frac{S_m - S_m}{SD}$$

2

The sample standard deviation is denoted by SD.

A randomly assigned sample is made up of,

$$E_h = \sigma_0 + \sigma_1 S_{m_h} + \mu_{0_h}$$

3

Where  $\mu_{0_h}$  is error-based  $v^2$ .

Following that, the errors must be independent of each other, as detailed below.

$$t_v = \sqrt{U} \frac{t}{\sqrt{t^2 + u - 1}}$$

4

Where the random variable is denoted by  $t_v$ .

The standard deviation is then used to normalize the changes in the variable.

The following formula is used to calculate the moment scaling deviation.

$$M_{SD} = \frac{\delta^{ms}}{\tau^{ms}}$$

5

Where moment scaling is denoted as "ms".

$$\delta^{ms} = EX \left( R_v - \gamma \right)^{ms}$$

6

In the above equation,  $R_v$  and  $Ex$  are representations of randomized variables and expected outcomes respectively.

$$\tau^{ms} = \sqrt{EX(R_V - \gamma)^{ms^2}}$$

7

$$COV = \frac{ms}{R_V}$$

8

The variant of the coefficient is represented by COV.

The process of feature scaling is terminated by setting all variables to 0 or 1. The unison-based normalizing process is what it's called. The normalized equation would therefore be written as follows:

$$R'_V = \frac{t - t_{min}}{t_{max} - t_{min}}$$

9

The range and consistency of the data may remain constant after the input has been normalized. The goal of this phase is to reduce or eliminate data delay. Following that, the normalized data can be utilized as an input to the next processes.

### Clustering using the Hierarchical K-means (HK) technique:

Because college students' interactional activity is variable, it is important to build tighter groups of students with similar interactional characteristics, and Hierarchical K-means clustering provides the best fit for the given dataset and is superior to any other grouping approach. Clustering divides m samples into j groups, with each input attribute belonging to one of the clusters and not the others. When the teacher has completed grading the students, he could build up and complete the grouping using the data he has gathered.

For K-means clustering, go through the steps below.

First set the beginning condition by defining the number of clusters and selecting the cluster centers at random. The distance between the qualities is measured using Euclidean distance.

$$z(c, d) = \sqrt{(c_1 - d_1)^2 + (c_2 - d_2)^2 \dots + (c_m - d_m)^2}$$

10

$$z(c, d) = \sqrt{\sum_{h=1}^m (c_h - d_h)^2}$$

11

Where  $c$  and  $d$  are two Euclidian locations and  $z$  is the distance between them. Second, allocate each data point to the cluster center closest to it to create a new division. Third, update the centers for clusters that have gained or lost data points. Finally, repeat steps 2 and 3 until you reach a distance convergence threshold.

### **Feature extraction using Variational autoencoder (VAE):**

To see which data separation technique on 5G network connection data may improve clustering. Feature extraction is a method for extracting new features from an original dataset is as we want to lessen the measure of resources needed for processing without sacrificing crucial qualities, this method is effective. Removing aspects can also aid in the reduction of unnecessary characteristics in a study. Feature extraction transforms basic features into more significant features in a surprising way. To reduce the high dimensionality of the feature vector, feature extraction is a procedure for constructing new features that rely on the original input feature set. The transformation is carried out using algebraic transformations and some optimization criteria. In addition, while dealing with high-dimensional challenges, feature extraction can manage critical information. By preserving the original relative distance between features and covering the original data potential structure, these dimensionality reduction strategies strive to avoid losing a considerable amount of information during the feature transformation process.

### **Boosted TCP Protocol (BTCP):**

The direction of social and intellectual workers in the educational techniques employed is the framework as an education model. It is an important part of IPE's ideas, theories, and technical orientations, as well as radical social and intellectual conceptions. Experts in IPE theories created a structure to improve cognition, action, and expression. Thinking based on an understanding, IPE frameworks make up the education governance framework.  $H_1$  and  $H_2$  reflect the administrative structure and experimental units, respectively. The following equation depicts the similarity between the databases of college students in the IPE:

$$Similarity = Sy = \frac{2k(H_1 + H_2)}{kH_1 + kH_2}$$

12

The number  $k$  signifies the module's number, and the similarity within university student records denotes similarity among the two databases. The following equation depicts the distributing of data as shown below,

$$DD = Sy * (F + G * k) * [kH_1 + kH_2]$$

13

In this scenario, F represents the role of human interest, and G represents the sense of confusing tasks in an education sector, IPE as a way of feeding nations that need liberty, rather than the base of IPE. As shown in equation (14), the expertise IPE structure is an academic structure that relates to describing the illogical growth of the knowledge economy, which has lost its fundamental place in life learning.

$$Sy = \beta_f (k_1 S_1 + S_2 k_{t-1} + S_1 k_{t-1} + S_1)$$

14

To further clarify its application effect, the approach is used to the teaching of political and ideological subjects in a freshman class at universities. The students' attitudes about political and ideological courses, their level of satisfaction with classroom teaching, their acceptability of political and ideological courses, as well as their learning circumstances are all examined using the questionnaires utilized in this study. The acceptance of political and ideological courses may be higher, which can be used to evaluate the use of the MATLAB Simulation tool for IPE.

#### **Enhanced Fruit Fly Optimization (EFO):**

Within a radius of one, the basic FFO develops food sources around its swarm site. This radius is set in stone and cannot be modified throughout the iteration process. The main disadvantage of the EFO is more iterations are required by the algorithm to obtain an ideal solution. The fruit fly swarm site is frequently far from optimal in early iterations; the search radius may be too limited, and a significant increase in iterations is required to identify a favorable spot. The swarm area is close to an optimal or near-ideal solution in the last generations. The fine-tuning of solution space necessitates a very limited scope. This search radius is excessively broad. Fixed values of search radius can help improve the FFO's performance and reduce its flaws. It can also be expressed in the following equation (15).

$$\rho = \rho_{max} \exp \left( \log \left( \frac{\rho_{min}}{\rho_{max}} \right) \cdot \frac{I}{I_{max}} \right)$$

15

Where  $\rho$  = each iteration's search radius

$\rho_{max}$  = maximum radius

$\rho_{min}$  = minimum radius

I = iteration number and

$I_{\max}$  = maximum iteration number.

To improve the intensive search, we don't modify all of the swarm location's decision variations while creating a new solution. Instead, we pick one decision variation at random from a uniform distribution. Let  $a \in \{1, 2, \dots, m\}$  be a number picked at random index. As follows, a new solution  $Y_i = (y_{i,1}, y_{i,2}, \dots, y_{i,m})$  is formed.

$$Y_{i,j} = \begin{cases} \sigma_j \pm \rho \cdot \text{ran}() \text{ if } j = a \\ \sigma_j \text{ otherwise} \end{cases} \quad j=1,2,\dots,m \quad (16)$$

A suitable initial swarm location could speed up convergence to good solutions. To choose a decent swarm location, we generate a population of PS solutions at random, and the best one is chosen as the first fruit fly swarm location.

## Algorithm

Enhanced Fruit Fly Optimization (EFO)

*//Initialization*

*Parameters setting  $a$ ,  $\rho_{\max}$ ,  $\rho_{\min}$ , and  $I_{\max}$*

*for  $i=1, 2, \dots, b$  // produce food source  $Y_1, Y_2, \dots, Y_a$*

$$Y_{i,j} = L_j + (U_j - L_j) \times \text{ran}(), j = 1, 2, \dots, m$$

*end*

$\nabla \leftarrow \arg\left(\min_{i=1,2,\dots,b} f(Y_i)\right)$  *//representation of swarm location*

$I=0$

$$Y^* = \nabla$$

*Again*

$$\rho = \rho_{\max} \exp\left(\log\left(\frac{\rho_{\min}}{\rho_{\max}}\right) \cdot \frac{I}{I_{\max}}\right) \text{ // foraging phase of ophersis}$$

*For  $i=1,2,\dots,b$*

*$a$ =random number between  $[1, m]$*

// produce food source  $Y_i = (y_{i,1}, y_{i,2}, \dots, y_{i,m})$

$$Y_{i,j} = \begin{cases} \sigma_j \pm \rho \cdot \text{ran}() \text{ if } j = a \\ \sigma_j \text{ otherwise} \end{cases} \quad j=1,2,\dots,m$$

If  $Y_{ij} > U_j$  then  $Y_{ij} = U_j$

If  $Y_{ij} < L_j$  then  $Y_{ij} = L_j$

end for // vision forging phase

$$Y_{best} = \arg\left(\min_{i=1,2,\dots} f(Y_i)\right)$$

If  $f(Y_{best}) < f(\nabla)$  then  $\nabla = Y_{best}$

If  $f(\nabla) < f(Y^*)$  then  $Y^* = \nabla$

$$I \leftarrow I + 1$$

till  $I = I_{max}$

The above mathematic technique depicts the entire computing approach for the presented IFFO algorithm.

## IV. Performance Analysis

We have employed a MATLAB simulator in this study to examine and contrast the behavior of the proposed protocol with the existing protocols.

### Throughput:

It is the total number of packets sent via the network from sender nodes to reception nodes at any given time. It is usually expressed as packets per second or bits per second. To achieve better results, the throughput must be comparable. Equation (17) is used to calculate the value of throughput.

$$T = \frac{R_p}{R_f - R_i}$$

17

Where  $R_p$  = received packets

$R_f$  = last or end packet

$R_i$  = starting packet

Figure.2 depicts a comparison of throughput in kilobits per second for the present and proposed methods. When compared to other existing protocols, our proposed technique has a higher throughput, as seen in the graph. This paper proves efficient throughput than the existing methods for each node to get higher data transmission.

### **Good-put:**

The rate at which meaningful data traverses a network is referred to as goodput. Goodput and throughput will be as near as they can theoretically be assuming an uncongested channel between endpoints.

Figure.3 depicts a comparison of good-put in kilobits per second for the present and proposed methods. When compared to other existing protocols, our proposed technique has a higher good-put, as seen in the graph. This paper proves efficient goodput than the existing methods for each node.

### **Transmission rate:**

The number of bits per second that can be sent is the transmission rate. It also determines how long a sign stays on the wire. Figure.4 depicts a comparison of transmission rate for existing and proposed methods. When compared to other existing protocols, our proposed technique has a higher transmission rate, as seen in the graph. This paper proves a higher transmission rate than the existing methods for each node to get higher data transmission.

### **Execution time:**

It's the amount of time it takes for a 5G node to compute the functions required for data transmission. The proposed approach and the existing method are compared in terms of executing time in seconds in Figure.5. When compared to existing protocols, the graph clearly shows that our suggested technique takes the shortest time to transmit data. This paper proves reduced execution time than the existing methods for each node.

## **V. Conclusion**

The creation of IPE is the topic of this study and evaluates the system's performance and functionality. At the same time, the Boosted TCP's performance for IPE is assessed. The created system's political and ideological courses courseware management, online discussion, and classroom evaluation management functions can be used regularly on both the instructor and student terminals. Furthermore, the system's application effect in practical teaching is relatively good. The suggested system's Boosted TCP can successfully improve students' attitudes toward IPE, increase satisfaction and acceptance of classroom teaching, and develop ideological and political information mastery. This paper contributes to the intelligent development of IPE and has lots of experimental application values and significance, i.e., throughput, good-put, and transmission rate were proven to be faster than other existing methods, and

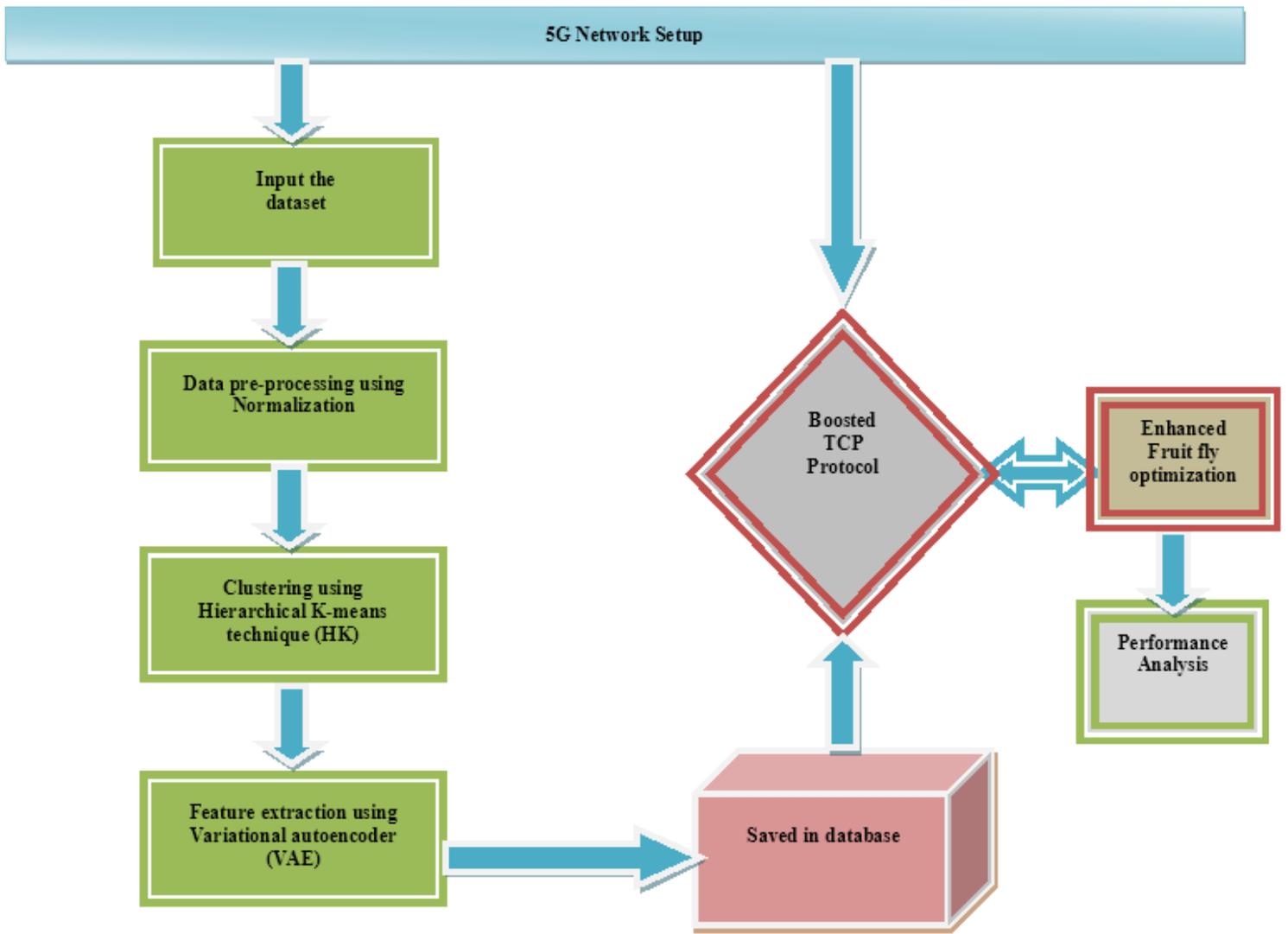
the execution time was reduced compared to other methods using the enhanced fruit fly optimization technique. The quality of data transmission can be attained in the future if we focus on cost and energy consumption. The fastest data transfer can be achieved by increasing the good-put and minimizing the execution time.

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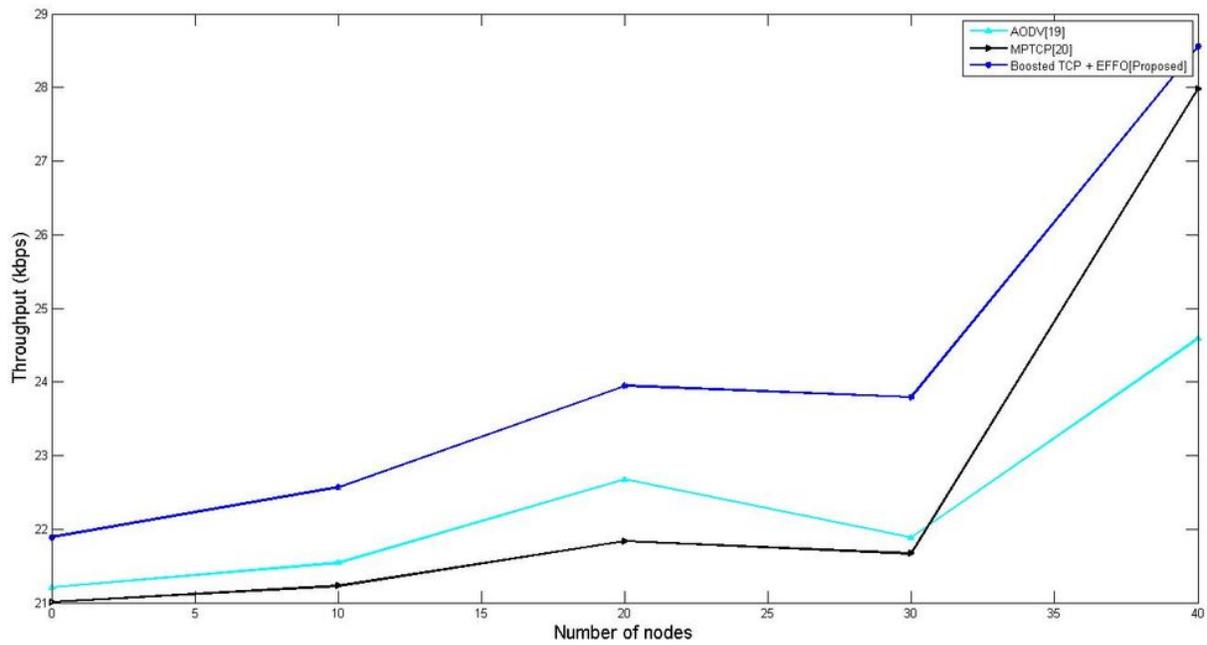
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## Figures



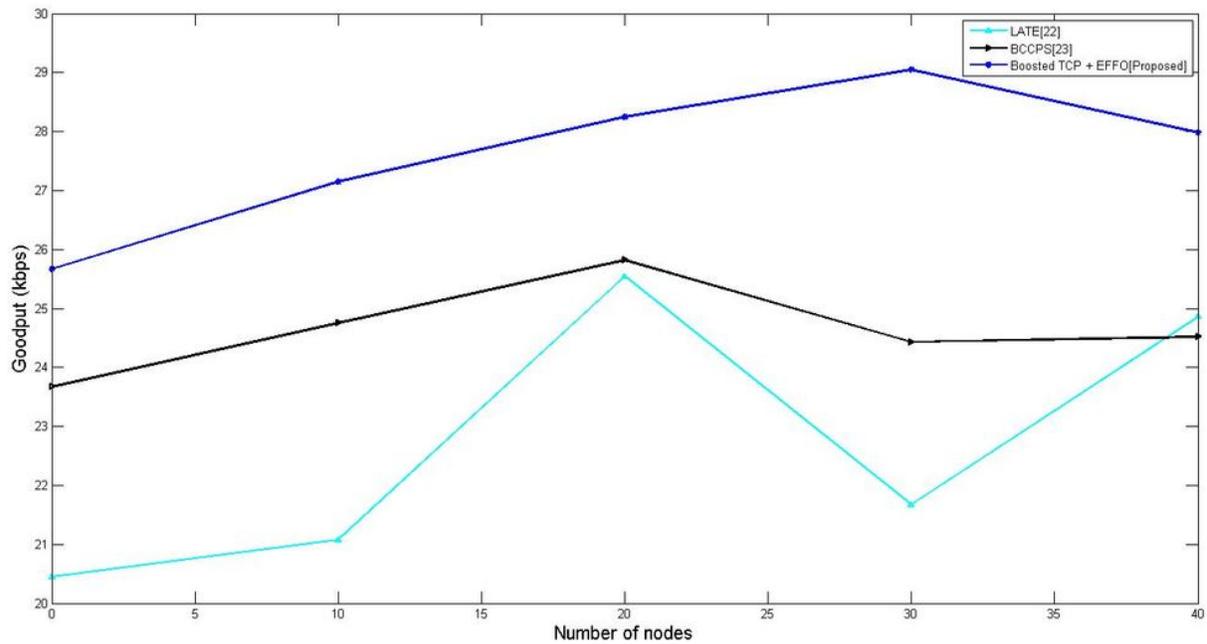
**Figure 1**

Proposed structure flow



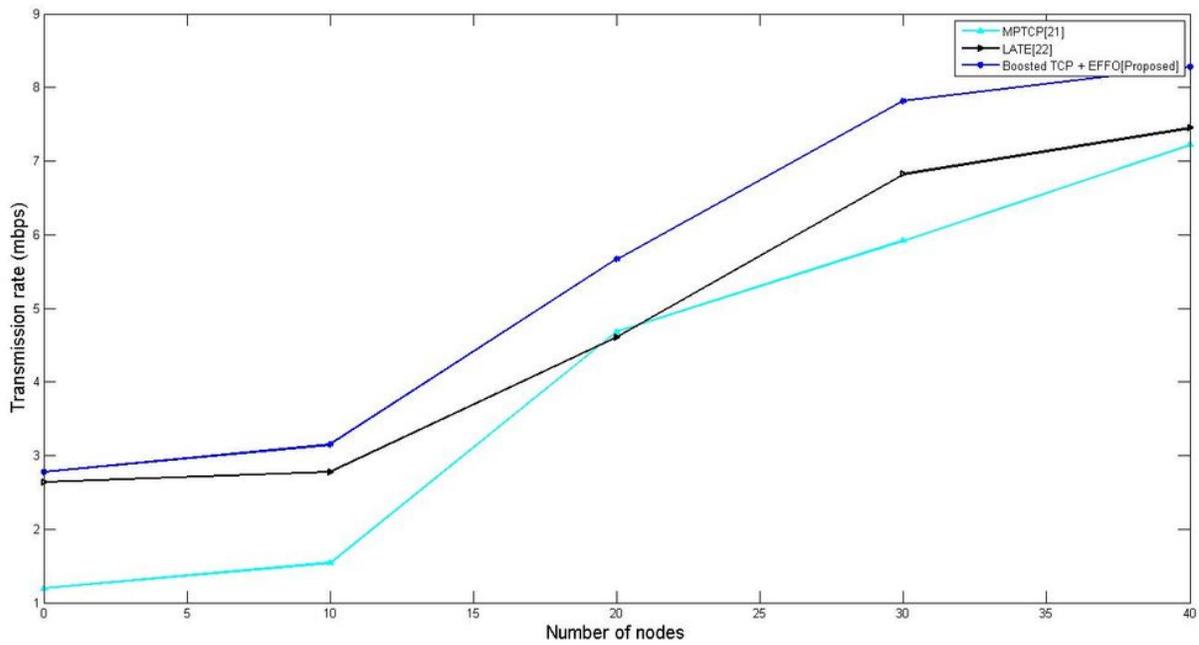
**Figure 2**

Comparison of throughput (kbps) in present and proposed methods



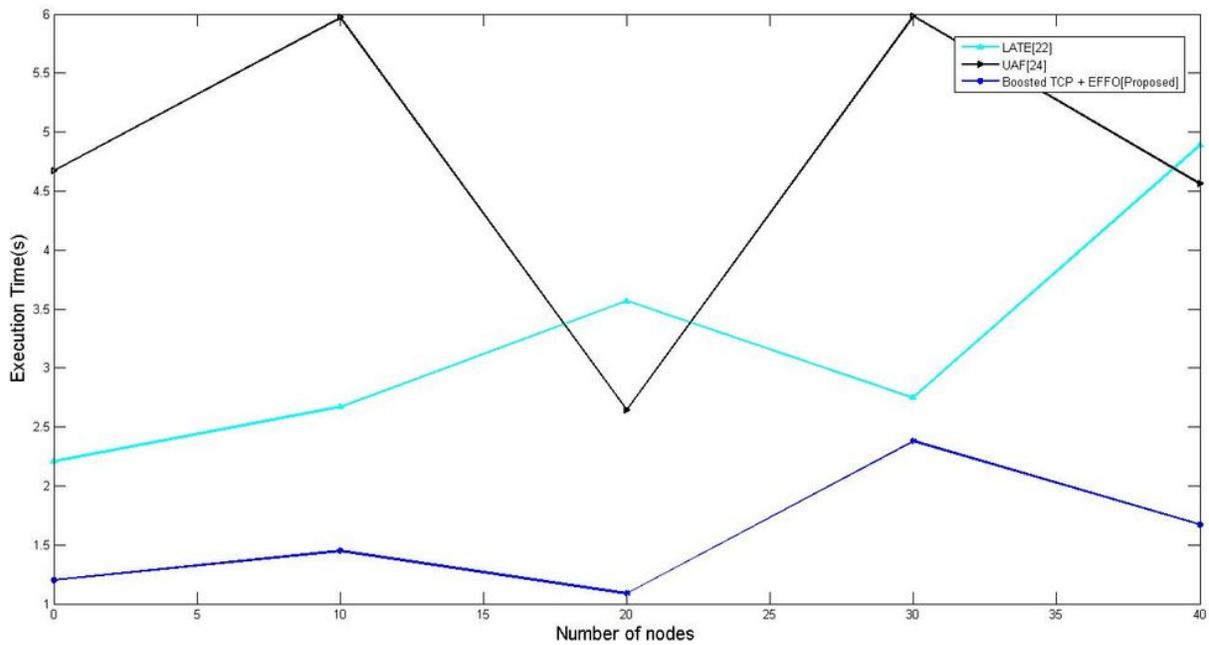
**Figure 3**

Comparison of good-put (kbps) in existing and proposed methods



**Figure 4**

Comparison of the transmission rate (Mbps) in existing and proposed methods



**Figure 5**

Comparison of Execution time (s) in existing and proposed methods