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Research on the Development and Innovative Strategy of Knowledge Payment Platform in the Internet Era

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Abstract

The widespread adoption of knowledge-based payment systems and numerous online knowledge-based paid items is made possible by the quick development of knowledge information and networking technology. Paid columns were quickly introduced by platforms like Himalaya FM, Zhihu, and Qingting FM, while pay-for-knowledge businesses like Fenda, iGet, and Qianliao quickly went live online. Users rapidly increased, and it was assumed that the knowledge payment progressive trend had been met. This paper aims to examine the emergence of edge computing into the mobile information system into the presence and inevitability of the knowledge payment platform, evaluate the advantages, challenges, and pathways for knowledge payment platform optimization, and try to provide a conceptual suggestion for aiding in its advancement. During data analysis, the independence of the polynomial characteristics was evaluated using Pearson's chi-squared tests. A brand-new meta-heuristic optimizer dubbed Harris Hawks optimization is inspired by how Harris hawks seek food in the wild. According to the experimental results, 98 of the survey's respondents—or 19.1% of all respondents—were under the age of 18; 201 were between the ages of 18 and 29; 142 were between the ages of 30 and 39; and 73 were over 40, or 14.2% of all respondents. The findings indicate a younger age distribution for the sample, with the concentration being highest among those between the ages of 18 and 29, then 30 to 39. The mobile information system edge-based knowledge payment platform has successfully undergone continuous use behavior analysis.

Keywords: Knowledge Payment Platform, Pearson's Chi-squared,

 | ***Ameliorate Harris Hawks Optimization, Edge Computing***

1. Introduction

The supply and demand of knowledge have changed as a result of the paradigm shift from free to paid information. Today, information producers develop both standard and regulated paid special knowledge through a systematic process as a result of the global shift to a knowledge-based economy and the increased demand for knowledge services and commodities and those knowledge-seeking individuals may subsequently obtain those informational things through subscription procedures of knowledge payment platforms. Websites like Quora, Yahoo! Answers, and Stack Overflow in the US are examples of industrial pioneers. Due to the growing demand for knowledge acquisition and advancement, as well as the effects of marketing anxiety, the knowledge payment sector has grown and increased significantly in recent years [1,2]. For instance, it was projected that China's knowledge payment industry will be worth 4.9 billion yuan in 2017 [3]. The 205% annual growth rate of the Chinese knowledge payment services industry [4] demonstrates the market's immense expansion potential. There were 48 million users of knowledge payment services in 2015; by 2018, there were 292 million users, an increase of 82.5% on average annually. From 1.59 billion yuan in 2015 to 16.58 billion yuan in 2018, the market increased by an average of 118.5% [5].

The Times and other news organizations started considering the topic of news pricing in 2015, and they developed a concept of a mobile-based online knowledge payment platform and PC versions of their websites as well as other mobile application platforms [6,7]. In 2016, platforms for global online education like Coursera and Udemy launched. They received $20 million of funding in 2018, which also represented the quick development of global online information platforms built on the two pillars of "social + paid [8].

Basic hints for this study problem are provided by factors examined from platforms that charge for knowledge. Although it is rarely considered a potential predictor of knowledge quality [9], the cost of knowledge is often recognized as an important determinant of a purchaser's cost [10,11]. According to the information available on knowledge payment systems. The cost-benefit analysis states that higher prices and worse quality generally result in reduced consumer satisfaction [12]. Moreover, from a multitude of perspectives, customers' former knowledge consumption behavior may also affect their current satisfaction because consumers have a propensity to be "sticky" to particular internal reference points [13], including such history prices and historical contentment. The platform is of poor quality and is experiencing lending competitors or homogenization. From the beginning of 2017, the amount of well-known payment knowledge platforms has steadily decreased [14]. The population dividend has diminished, and as a result, payment knowledge platform user growth has slowed down. As a result, concerns, including the effect of Internet personalities and content enjoyment, have started to attract attention. It inevitably leads to the logical purchase of information. There is debate concerning gender. The paying-for-knowledge platform is now forced to reflect on its capabilities and determine whether it can continue to grow [15]. An immediate solution must be found to the fundamental conundrum of how to increase public acceptability and use levels. The term "knowledge payment platform" describes the practice of knowledge providers offering assistance to those in need in exchange for a price, which has many of the same features as e-commerce [16]. Provide separate groups for knowledge payments, such as funded inquiries and responses, funded articles and courses, and live social streaming. Also, some academics have outlined the rationale behind why consumers seek out and utilize online knowledge [17]. Namely, the rationale behind why users choose the knowledge payment platform [18]. Users are encouraged to use knowledge communities or learning systems with high-quality content because these tools are practical and can boost individual performance. As a result of their utility, they can boost an individual's performance [19], showing how the professionalism, variety, and accuracy of knowledge, along with the usefulness, promptness, and conversation at the hand of search, enhance user motivation to explore for knowledge and utilize the knowledge payment platform [20].

The following is the work's contribution:

- The hardware architecture of the system was developed, and the equipment type to be used for edge computing was chosen.
- The SD-CEN architecture, based on distributed parallel computing, introduces the time delay

theoretical model and offloads subtasks to each MEC device.

- Categorization and evaluation of the presenters' backgrounds various user classes, and well-known paid knowledge apps now accessible are addressed in order to show the article's practical applicability.

The rest of the paper is organized as follows: In Section 2, the existing research is presented, and in Section 3, the proposed work is discussed; in Section 4, the results and discussions are presented, and finally, Section 5 explains the conclusion and further work.

2. Related Work

One popular method for enabling m-commerce to complete a deal is the NFC mobile payment. Yet, establishing confidence between the parties involved in the transaction depends critically on fair exchange and information security. Researcher-developed NFC mobile payment mechanisms are numerous. Yet, the majority of them still lack several essential qualities, such as information security and fair sharing, which may limit their use. Eventually, the Scyther tool is used to assess the system's security [21]. We outline a secure indoor positional awareness mobile payment security mechanism and a design for a mobile payment system employing BLE technology. The proposed protocol comprises three phases: commencement, creation of the session key, and verification. As the customer approaches the POS counter area, the mobile payment device will autonomously identify their location to assess if they are willing to complete the transaction procedure. When it has been established that the consumer is present inside the payment-capable region, using the payment system start, the POS and consumer smartphone use a BLE interface to authenticate each other [22]. In order to complete the money transfer as required, this will make a secure session key, and then establish a trusted interface.

2.1 Review of Machine Learning Model

The automated summarize extracting approach for reinforcement learning, attention processes, and bidirectional long short-term memory (BiLSTM) in the mobile payment area (RL). The methodology for knowledge acquisition is then applied to the paper defining the mobile payment policy to extract the executive summary. When compared to other fundamental models, our suggested model outperforms them in the Rouge-2, Rouge-4, and Rouge-SU4 indices. Pertinent information already published makes it easier to learn about mobile payments and aids managers and users of mobile devices in lowering operational financial risk [23]. The incorporation of prior human knowledge is made possible by an extension of boost algorithms, which can make up for a lack of training data and enhance prediction outcomes. Expert rules and blacklists are the result of transferring prior human knowledge from other areas or from historical fraud transactions. Using the knowledge, risk features are extracted from transaction information and merged with other features to complete training. Finally, we include a boosting method that takes advantage of prior human knowledge to improve model performance [24].

Supplementary users can make use of the numerous channel gaps in the licensed spectrum bands thanks to the cognitive radio technology known as dynamic spectrum access (DSA). DSA is a promising option to reduce the issue of spectrum shortage and boost spectrum use. While DSA has recently attracted much attention in the research community, this article provides an overview of spectrum allocation strategies that combine competitiveness and cooperation to address the problem of spectrum usage in cognitive radio networks [25]. The design and testing of an automatic immediate alert message (SMS) into the online payment system. The payment gateway notifies parents and guardians as soon as payments are made on behalf of their wards or children. This enables the parent or guardian to monitor the condition of their children or wards in the institution. One of the contributions to the security aspects of students' online payments was the introduction of the SMS alert algorithm, which promptly gives payment information to parents. The incorporated SMS codes were used in this study as a benchmark for comparison with other peer-reviewed articles that were unable to incorporate a parental automated feedback mechanism into their works [26].

2.2 Review of Knowledge Payment Platform in the Modern Era

China's knowledge market has enormous potential, and paying customers are growing. The knowledge payment platform, however, has also run into a number of issues when it was being developed. For instance, how to attract current and new clients' willingness to purchase different sorts of network knowledge, financial industries, etc. Based on consumer samples, 410 valid survey responses were gathered for this study. This study experimentally examines, from the viewpoint of

user perception, the motivating elements of customers' purpose of purchasing to acquire knowledge-based paid products using the regression analysis approach. Perceived utility, considered entertaining, perceived utility, and technical features are used as independent variables in a factor model that influences the desire to acquire knowledge-based products while purchasing behavior is used as the dependent variable [27]. A smart contract that features a robust communication algorithm built on Ethereum can be used to provide a general platform for supply chain stakeholders that allows for decentralized information communication, authorization, and process automation. By reducing the risk of non-payment throughout the payment term, the smart contract is advantageous to the provider. The ability to track products and make on-time deliveries benefits the purchaser as well.

Last but not least, the 3PL dramatically lowers its costs by decreasing the total cost of paperwork and the need for a product tracking system [28]. The general people should have embraced digital payment to limit the need for cash for transactions since it is one of the media used to spread viruses. Bank Indonesia, an organization that controls digital finance laws, must have an efficient approach to assisting MSMEs in advertising their goods through online advertising if it is to expand the adoption of digital payments and help Indonesia's transformation to a cashless society more quickly. A case investigation took place at one of the MSMEs that Bank Indonesia supported as part of the qualitative technique for this study. People must understand how Bank Indonesia's development strategy enabled MSMEs to overcome the COVID-19 outbreak by utilizing digital marketing while fostering the usage of digital payment to speed up Indonesia's transition to a cashless society [29]. In order to learn as much as possible about the risks associated with Internet finance and to guarantee its speedy and sound development, the risk variables of Internet finance were examined using random forest (RF), a typical machine learning classification method. Also, the performance of RF and back- propagation (BP) neural network approaches was assessed along with the outcomes of conventional statistical methods. Ultimately, recommendations were made for these risk variables, particularly for the issues that carried a significant risk. The outcomes demonstrated the RF algorithm model could accurately analyze the risks of Internet finance. They had the best classification effect in regard to professional knowledge, market, legal, credit, and personal data [30]. This research uses edge computing to intelligently compute the data-gathering node in order to guarantee continued use of the knowledge payment platform within the mobile information system. The security has changed significantly from the past.

3. Methodology

Several knowledge-based online purchased products and knowledge-based payment methods have gained widespread adoption as a result of the quick expansion of knowledge information and internet technology. Paid columns were quickly introduced by platforms like Himalaya FM, Zhihu, and Qingting FM, and pay-for-knowledge businesses like Fenda, iGet, and Qianliao quickly went live online. Users grew rapidly, and it was believed that knowledge payment had reached its peak in terms of development trends. The need to resolve issues with the SD-CEN architecture, such as merging various edge computing devices to perform spatial and temporal services fashion, to figure out the best position able to share according to the communication and computer processes of edge computing devices, how to unload distributed parallelization on each MEC and use the number of sub-tasks, has arisen because of the relatively limited a singular edge computing product's processing power. In order to address the aforementioned difficulties, this paper simulates the response times delay in the SD-CEN structure, which is due to integrating computation and interaction technologies. This research seeks to examine the integration of edge computing into the mobile information system to the presence and necessity of the knowledge payment platform; analyses the benefits, difficulties, and paths for knowledge payment platform optimization; and attempts to serve as a conceptual guideline for trying to promote its advancement. Using Pearson's chi-squared tests, the independence of the polynomial features was assessed throughout data analysis. The way Harris hawks forage for food in the wild served as the inspiration for a brand-new meta-heuristic optimizer called Ameliorate Harris Hawks optimization.

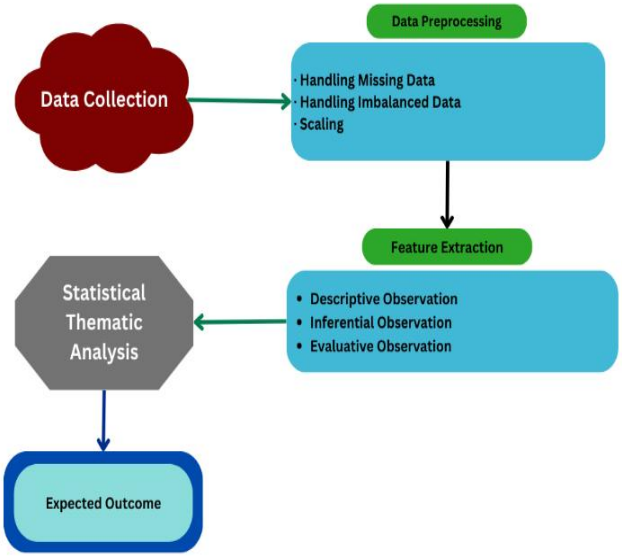

Figure 1. Flowchart of Proposed Methodology

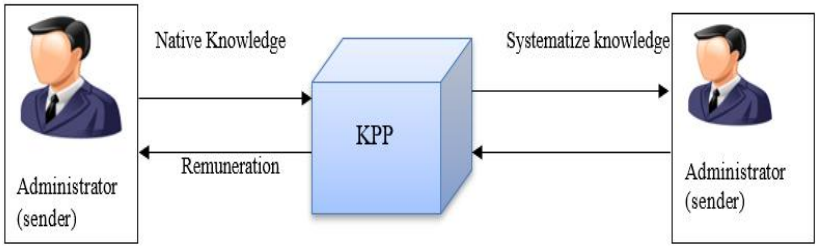

Figure 2. Knowledge Payment Platform

Figure 1 displays the knowledge payment platform. According to the theoretical stance, Real knowledge and value knowledge are two categories of knowledge. True knowledge, particularly that of the natural sciences, is an unchanging universal law. Value knowledge bears a unique imprint on the topic of cognition the fact on the topic of cognition. On knowledge, including experience, ideas, and inspiration, knowledge is processed. In the present state of social knowledge, scientific knowledge and knowledge of value are valid. The former can aid in improving public understanding of the natural world. The information of the payment knowledge platform is primarily knowledge as opposed to the traditional knowledge taught in K12, making it more evident how it can help the general population become more socially adaptable. Figure 2 shows the interaction between the stake-holders in the knowledge payment platform.

3.1 Data Collection

Every data-collecting node in the computer edge system completes the information gathering for acne equipment. The fundamental elements of each node are a terminal device and multiple external devices. External gear is used for data collection for physical data. Throughout the data-collecting process, all device types will transmit the acquired data in actual time and according to a set structure to the communication resources. In order to work with the majority of external systems, most cutting-edge technologies offer a variety of equipment, such as UART, USB, and mobile communication interconnects. Before data from several sensors, whether it be network data or physical data, can be delivered to the most advanced technology, the data processing unit inside the device must clear the data. The data are then kept in a predetermined manner in the cloud. The first is the edge device, based on the way the system operates and how the program scripts are designed. Packet loss and delay are just two of the issues brought on by network congestion. To match the transmission needs of the numerous sensors sold on the market, the device must also offer a wide range of hardware connection interfaces. Finally, it is designed for use in particular circumstances.

3.2 Model for Delay Theory in the SD-CEN Architecture

The proper workload division in line with power and the proportion of the sub-tasks to distribute parallel processing have developed into critical difficulties in the SD-CEN architecture for each MEC device. This is how modeling looks:

$$t = max\left\{\frac{\alpha_i Task}{d_{v_i}} + W_{v_i,v_j} m_{v_i,v_j}\right\} + \frac{Task_{pre}}{d_d} + W_{v_i,d} \quad (1)$$

Between them, $\left(\frac{\alpha_i Task}{d_{v_i}}\right)$ reflects the time taken for the computation $Task_i$ auxiliary MEC job v_i device, W_{v_i,v_j} indicate the transmission delay among edge computing v_i device and passing data to the edge computing apparatus, and m_{v_i,v_j} indicate that a sub-distributed exists relationship among edge computing v_i gadget and v_j. There exists a supplementary item allocation relationship when $m_{v_i,v_j} = 1$; there is a gap in the secondary item allocation connection when $m_{v_i,v_j} = 0$. The cloud's preprocessed feature information is mapped and identified with a time delay by $(\frac{Task_{pre}}{d_d})$ and a representation of the delay in connectivity required to give the cloud server the preprocessed features extracted by $w_{v_i,c}$.

A set of appropriate i task distribution indices are required to reduce the delay t formula to achieve the objective of a minimal response times delay and optimize the response times delay (1). In conclusion, the SD-CFN network architecture in the case of real-time face recognition, it is possible to express the response times delay as:

$$\min \max\left\{\frac{\alpha_i Task}{d_{v_i}} + W_{v_i,v_j} m_{v_i,v_j}\right\} + \frac{Task_{pre}}{d_d} + W_{v_i,d} \quad i,j = 1,2,\ldots\ldots,k, \quad (2)$$

$$s.t\, m_{v_i,v_j} = \begin{cases} 1 & \alpha_i \neq 0 \\ 0 & \alpha_i = 0 \end{cases} \quad (3)$$

$$\sum_{i=1}^{k} \alpha_i = 1 \quad (4)$$

3.3 Pearson's Chi-squared Features

During data analysis, the independence of the polynomial features was evaluated using Pearson's chi-squared tests. The correlations between the variables of interest were calculated using a multivariate contingency table. The personal information of the respondents was utilized to demonstrate relationships between various payment methods and one's level of financial literacy. The association table, which was derived using the formula, was used to calculate the statistics.

$$X^2 = \sum_{i=1}^{w}\sum_{j=1}^{k} \frac{\left(n_{ij} - \widehat{n_{ij}}\right)^2}{\widehat{n_{ij}}} = \sum_{i=1}^{w}\sum_{j=1}^{k} \left(\frac{\widehat{n_{ij}}^2}{\widehat{n_{ij}}}\right) - N \quad (5)$$

$$\widehat{n_{ij}} = \frac{n_{i.} \times n_{.j}}{N}$$

Additionally, after calculating the statistical significance of the relationship between the variables, Cramér's V coefficient was added to the data interpretation to confirm the potency of the relationships that were found. A value between 0 and 1 is provided by this measure of association between two nominal variables.

$$V = \sqrt{\frac{X^2}{Nmin((w-1),(k-1))}} \quad (6)$$

Where n is the total number, w is the number of lines, and k is the number of columns. Last but not least, $V = 1$ in the event of a functional link but 0 in the case of stochastic independence of features. A statistical method called Kendall's Tau (W), which measures relationships based on the rankings of the data, was used to determine if the correlation is positive or negative.

$$W = 12\frac{\left(\sum_{i=1}^{N} T_i^2\right) - \frac{\left(\sum_{i=1}^{N} T_i\right)^2}{N}}{m^2(N^4 - N^2)} \quad (7)$$

Moreover, Spearman's (rho) rank correlation coefficient supported the findings. The range of both correlation coefficients is from -1 to +1. The positive correlation indicates that both variables' rankings are rising. The absence of a positive connection means that while one variable's rank is rising, the other variable's rank is falling.

3.4 Ameliorate Harris Hawks Optimization Algorithm

A population-based meta-heuristic technique is the AHHO algorithm. It draws inspiration from hawks' natural habitat and hunting techniques. This method was developed by Harris hawks, who cooperate to find prey in the wild. They typically assault uninvited targets as part of their predation. The hawks can also use a variety of pursuing strategies in response to the environment's shifting characteristics and prey's propensity to flee. The algorithm in AHHO will be based on exploitation, exploration, and the transition between those three phases. The basic reasoning behind AHHO is shown in Figure 3. The AHHO algorithm has three stages: A. Exploration phase; B. Exploitation phase (extraction): Soft siege and harsh siege; C. Transition from exploitation to exploitation (extraction).

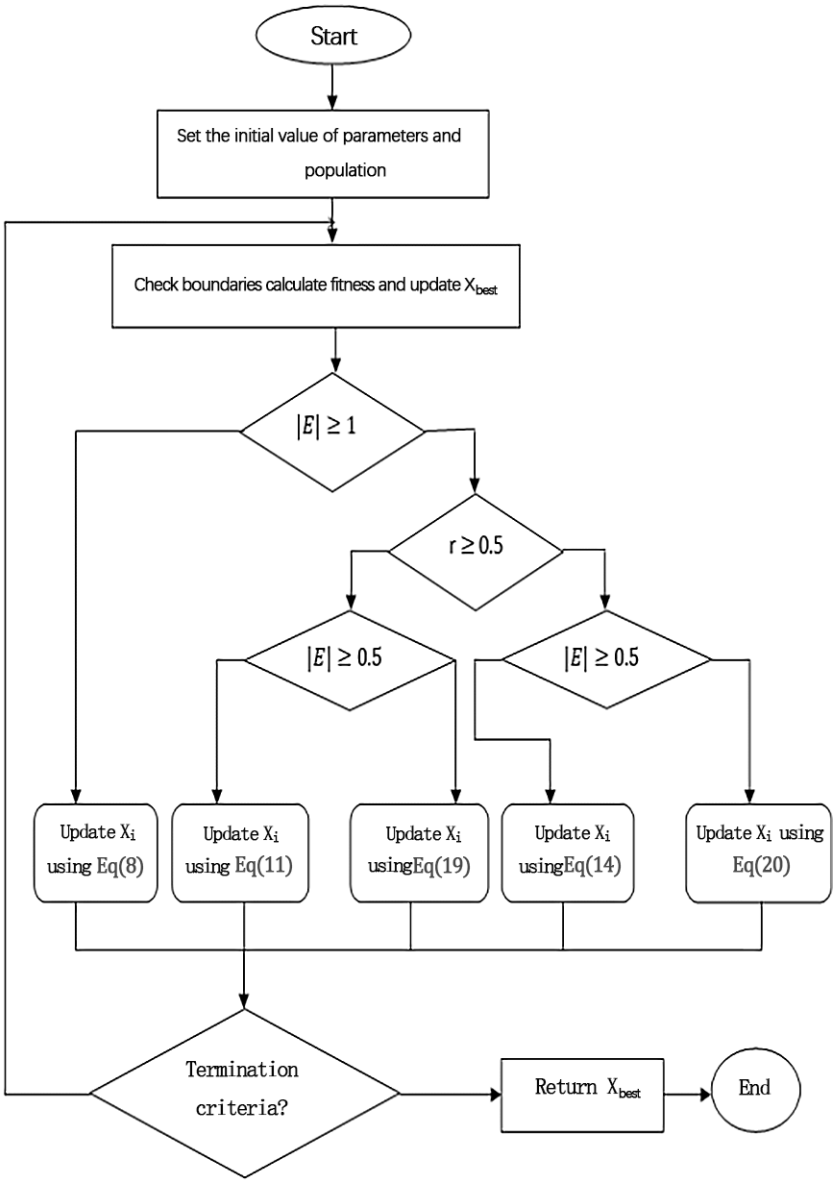

Figure 3. AHHO Algorithm Flowchart

3.4.1. Exploration Phase

With their acute sight, hawks may spot prey without being spotted. They monitor their target for several hours before attacking when it is most advantageous to their hunting strategy. In this approach, the best hawk (response) is presented as a hunting candidate (leader), and it may be the primary optimal response in its immediate vicinity. In the exploring phase, there are two different ways to place the hawks.

First-generation strategy: Depending on where other family members and their prey are, they choose their stance ($q \geq 0.5$).

Method 2: Within the search space, hawks are dispersed at random in various locations ($q \geq 0.5$). The position vector of the Hawks will be calculated in the stage after that as follows:

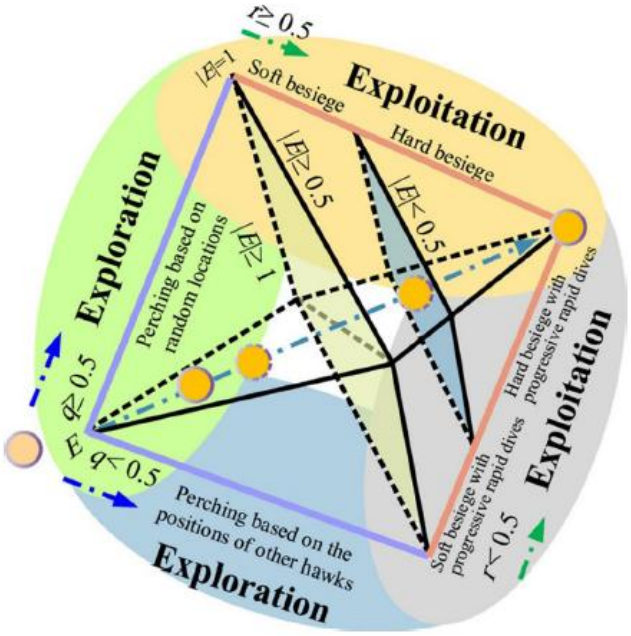

Figure 4. The Logic of AHHO

$$H(t+1) = \begin{cases} H_{rand}(t) - r_1|H_{rand}(t) - 2r_2H(t)| & q \geq 0.5 \\ \left(H_{rabit}(t) - H_m(t)\right) - r_3\left(L_B + r_4(V_B - L_B)\right) & q < 0.5 \end{cases} \quad (8)$$

Where $H_{rand}(t)$, $H_{rabit}(t)$, $H_m(t)$, L_B, and V_B stand for the community's random distribution of hawks, the rabbit's hunting location, the vector position of the hawks' current position, the lower and upper bounds, and the mean location of the hawks at the time. At each step, the parameters r_1, r_2, r_3, r_4 and q are changed with new, randomly chosen values between the intervals of (0, 1).

$$H_{mean} = \frac{1}{N}\sum_{i=1}^{N} X_i(t) \quad (9)$$

In this context, the hawk population and each hawk's location inside stage t are represented by N and $X_i(t)$. Making the changeover from the exploratory to the extraction step: Exploring and extracting can be switched between by this algorithm. The victim may change its behavior based on how much energy it still has. The prey loses energy as the run progresses. Equation 10 is used to compute the prey's energy:

$$E = 2E_0\left(1 - \frac{t}{T}\right) \quad (10)$$

There are two possible states in this situation, where E_0 and T stand for the beginning energy and the most steps:

1. $|E| \geq 1$: The exploration phase in this scenario needs to be updated and re-performed because the hawks are searching in different regions to locate the hunting location.

2. $|E| < 1$: In this scenario, the algorithm looks for the best solution to verify in its neighborhood before proceeding to the extraction stage.

3.4.2. Extraction Phase

The potential prey chosen in the earlier stage should now perform the surprise attack stage under the control of the hawks. As previously mentioned, this phase features two siege modes: mild and hard. Whatever condition we are in is determined by parameter E, or hunting escape energy.

A. Gentle siege: The hawks slowly circle the prey to drain its energy when it has enough to flee ($|E| \geq 0.5$).

The potential prey chosen in the earlier stage should now perform the surprise attack stage under the control of the hawks. As previously mentioned, this phase features two siege modes: mild and

hard. Whatever condition we are in is determined by parameter E, or hunting escape energy.

When the victim has enough energy to flee, the hawks use a "soft siege" to slowly encircle it and drain its energy ($|E| \geq 0.5$).

The Hawks' current location can be updated using the following formula:

$$H(t+1) = \Delta H(t) - E|JH_{rabit}(t) - H(t)| \quad (11)$$

Were,

$$\Delta H(t) = H_{rabit}(t) - H(t) \quad (12)$$

$$J = 2(1 - r_5) \quad (13)$$

Here, $\Delta H(t)$, J, r_5, a random value between 1 and 0, mimicking the motion of hunting, is used to represent the variation between the position vector of the meal and the current location. The hawks perform numerous quick team dives around the victim after the rabbit has the strength to escape the soft siege. They try to slowly veer off course in reaction to the prey's cunning movements. An updated position for the Hawks can be obtained using the formula below:

$$H(t+1) = \begin{cases} Y & if\ F(Y) < F\big(H(t)\big) \\ Z & if\ F(Z) < F\big(H(t)\big) \end{cases} \quad (14)$$

Were,

$$Y = H_{rabbit}(t) - E|H_{rabbit}(t) - H(t)| \quad (15)$$

$$Z = Y + S * LF(D) \quad (16)$$

$$LF(D) = 0.01 * \frac{u * \sigma}{|\vartheta|^{\frac{1}{\beta}}} \quad (17)$$

$$\sigma = \left(\frac{r(1+\beta) * \sin\left(\frac{\pi\beta}{2}\right)}{r\left(1+\frac{\beta}{2}\right) * \beta * 2^{\left(\beta - \frac{1}{2}\right)}} \right)^{\frac{1}{\beta}} \quad (18)$$

Where $u, S, D, \vartheta,$ and β stand for, respectively, the random value between 1 and 1, the problem's dimensions, the variable with a fixed value of 1.5, and the random value between 1 and 0.5. In order to emulate the deceptive actions of prey during the escape phase, $LF(D)$ is defined. Hawks continually shift places to counteract the various cunning moves of their prey. Consequently, based on these actions, they may decide which approach to the prey is most effective.

Heavy siege: The hawks tighten the siege as their target begins to lose energy. The following formula is used to determine the hawks' new location: In order to imitate the prey's deceptive movements during the flight phase,

$$H(t+1) = H_{rabbit}(t) - E|\Delta H(t)| \quad (19)$$

When the siege is difficult, and the victim lacks the energy to flee, hawks work to bridge the gap between themselves and the running prey. The accompanying math, in this case, is used to pinpoint the hawks' new location.

$$H(t+1) = \begin{cases} Y & if\ F(Y) < F\big(H(t)\big) \\ Z & if\ F(Z) < F\big(H(t)\big) \end{cases} \quad (20)$$

$$Y = H_{rabbit}(t) - E|H_{rabbit}\,(t) - H_m(t)| \quad (21)$$

$$Z = Y + S * LF(D) \quad (22)$$

The best offloading strategy for computational activities is created by the SDN controller using data collected from all devices, which is then distributed to every MEC device. Start the experiment next [31].

4. Results and Discussion

The audience's time and attention are fragmented as a result of the fragmentation of Internet information. The norm now is fragmented education. As a result, the dispersion and diffusion platform of information are all in better accordance with the preferences of the viewers for education and involve less effort. The audiences of payment-knowledge platforms are typically busier, and fragmented aspects are now better noticeable.

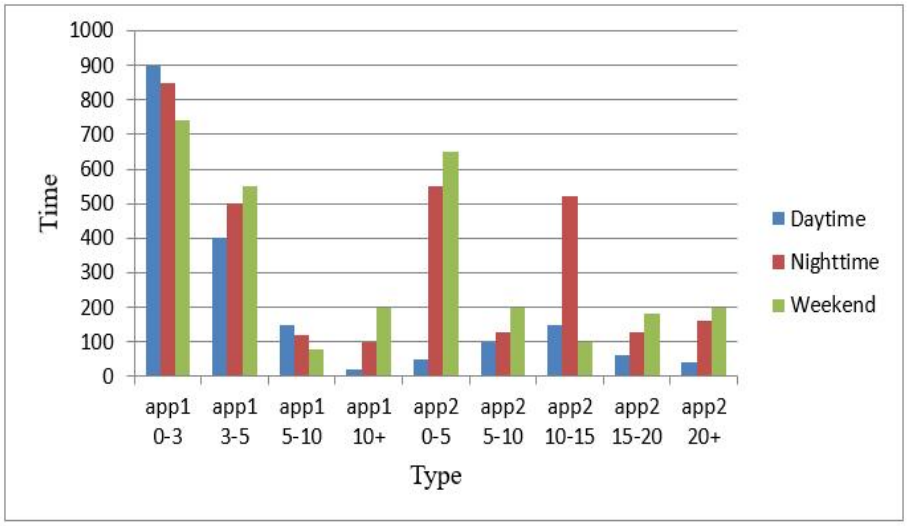

Figure 5. Paid-in-full Course Length

Figure 5 details the unit-paid course's duration. The main course period for APP1 is focused during the day, and less time is spent on Saturdays, whereas the main course time for APP2 is linear dependent during the evening and Saturdays. It is not difficult to conclude from a review of the duration of paid classes offered by various APPs. This benefits students more.

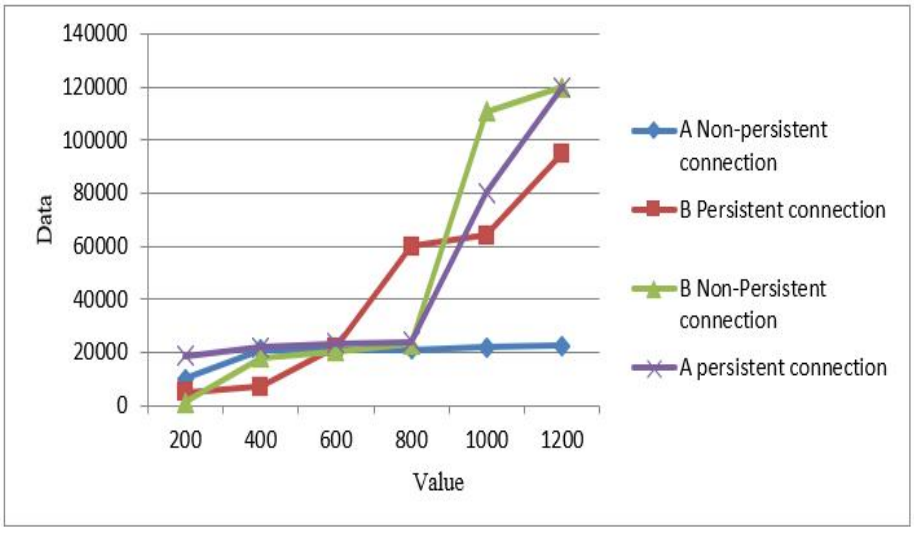

Figure 6. Number of Data Packets the Node Receives Each Second

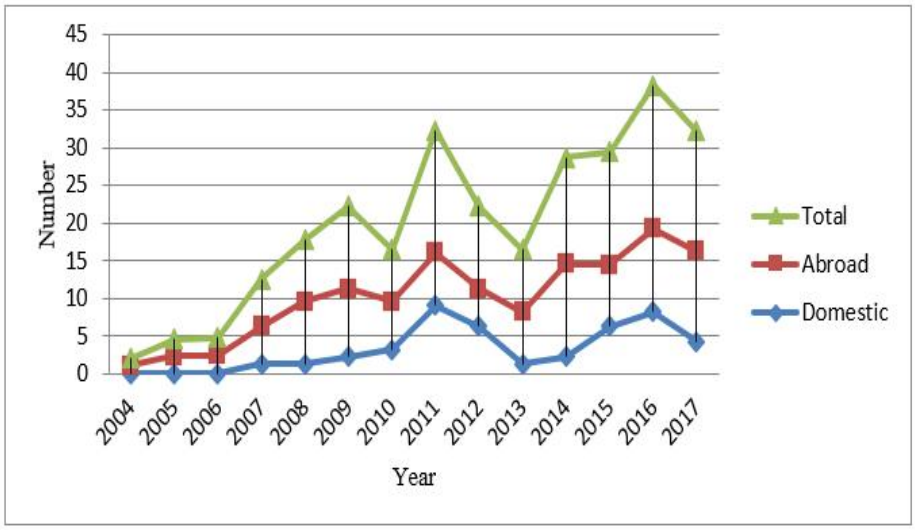

Figure 7. Worldwide Platforms for Paid Knowledge

Figure 6 displays the system's sample data. Figure 7 displays the annual distribution of papers published on both domestic and international knowledge payment platforms.

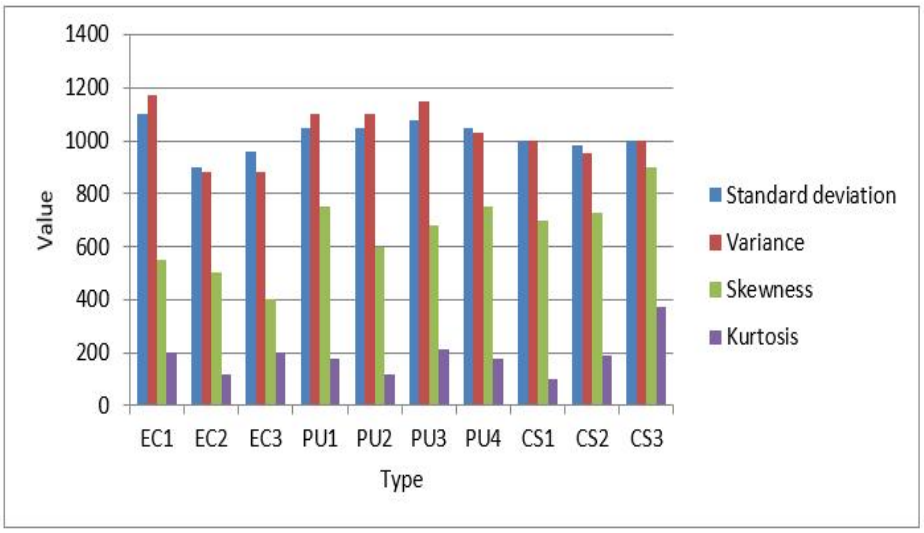

Figure 8. Statistics that Describe Each Variable

Figure 8 displays the descriptive statistics for each variable. According to the cultural capital hypothesis, engaging in cultural consumption not only serves to express one's self-identity but also to reproduce one's social class, hold a better social position, and advance one's own personal interests. The process of acquiring cultural value is consequently very practical and an endeavor to gain additional capital in kind, even though the "concealment and secrecy" of investing in cultural capital could mask the practical features of its behavior. Excel is typically utilized for statistics and analyses of pertinent data as part of the real statistical procedure. A list of many types of compensated expertise is provided in Table 1.

Table 1. iGet, Zhihu, and Himalaya FM all Charge for Course Classification

	Himalaya FM	**iGet**	**Zhihu**	**Amount**
Personal Advancement	18	25	20	63
Family Education	43	3	7	53

Aesthetic Psychology	9	3	10	22
Sharp Foreign Language Items	10	2	6	18
Song Life	8	2	3	13

The study of Himalaya FM, iGet, and Zhihu Live makes it evident the three business models rely heavily on paid subscriptions, internet Q and A, and teaching involves information dissemination. These three platforms have different content slants, and, Considering the complexity and range of their substance, they cover every aspect of life and work. The knowledge on these three platforms is both common and academic, multidimensional, and diverse. A comparison in Table 2 displays the results of the three platform effects on communication.

Table 2. A Comparison of the Three Platforms' Influence on Communication

Spread Effect	**Himalaya FM**	**iGet**	**Zhihu**
User Each Day	873.63	1.12	321.04
Daily Number Of Starts Per Person	4.67	3.8	5.34
Average Daily Usage Time Per Person	22.93	17.7	33.71
User Encounter	High audio quality, a wide range of application possibilities, and a welcoming neighborhood characterize the boutique area.	Boredom cannot set in during the early stages since they are so entertaining. Following the upgrade, knowledge is improved and overall community attitude is improved.	The overall attitude in the community is upbeat, the living quality is outstanding, and the effectiveness of the interactions is excellent.

Table 3 displays a comparison of the four procedures' calculating use. Yet, it enhances user identity ID security and forbids the keeping of sensitive variables written in text form. The enhanced protocol requires more computational resources from the user and the A and B protocol during the sign-up and login phases.

Table 3. Comparing the Three Techniques' Computing Costs

Protocol	**Stage of registration**	**Stage of login authentication**

	User	Gateway(H)	User	Gateway(H)	Terminal node(H)
A	1H	5	5H	5	3
B	_	3	3H	4	1
C	2H	5	8H	5	3

The samples are properly categorized based on gender, age, and educational attainment. Age is divided into brackets of 18, 30, and 40 years, and gender is divided into male and female categories. The border separating undergraduate and graduate education is used to categorize each level. Table 4 displays the sample's fundamental attributes. In terms of gender distribution, there are 260 female respondents, or 50.6% of the total, compared to 254 male respondents, or 49.4% of the total. Although there are somewhat more women than men overall, the gender ratio is not significantly different from that of men.

Table 4. Basic Characteristics of the Sample

Variable	**Measurement item**	**Frequency**	**Frequency Rate**
Gender	Male Female	253 262	48.3 50.4
Age	Under 18 18-29 30-39 Above 40	97 200 143 72	19.2 39.3 27.5 14.4
Education	Under Undergraduate Undergraduate Master's Degree or Above	173 274 66	33.5 53.6 12.7
Monthly Income	Under 2000 2000-3000 3001-5000 Above 5000	167 110 120 114	32.5 21.6 23.5 22.2

The questionnaire contains 98 respondents who are under the age of 18, who make up 19.1% of the total, 201 respondents who are between the ages of 18 and 29, who make up 39.1% of the total, 142 respondents who are between the ages of 30 and 39, who make up 27.6% of the total, and 73 respondents who are over 40, who make up 14.2% of the total. The results show that the sample age is skewed towards younger people, with the concentration being strongest in the 18- to 29-year-old demographic, followed by the 30-39-year-old demographic. This new kind of schooling is more likely to be embraced by youth due to the attributes of the paid education platform itself, which is primarily responsible for these distribution characteristics. According to data, undergraduates represent a large percentage of users on paid knowledge platforms.

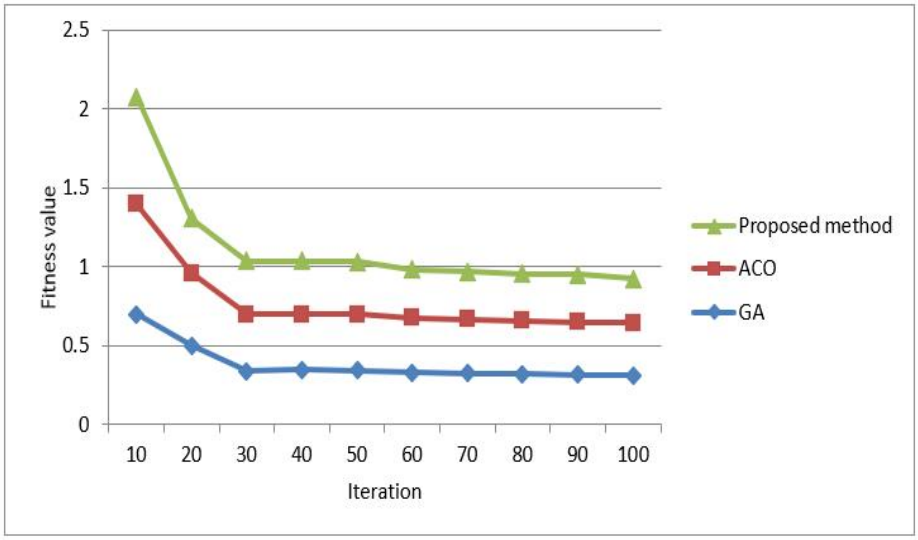

Figure 9. Diagram Demonstrating the Convergence of Three Techniques after 100 Iterations

The objective function is displayed over the course of the scrutinized iterations in order to analyze the converging of the specified algorithm. The findings demonstrate that the proposed method outperforms the GA and Ant Colony Optimization (ACO) algorithm in terms of fitness. To evaluate the proposed method's convergence, 100 replications of it are compared to the GA and ACO.

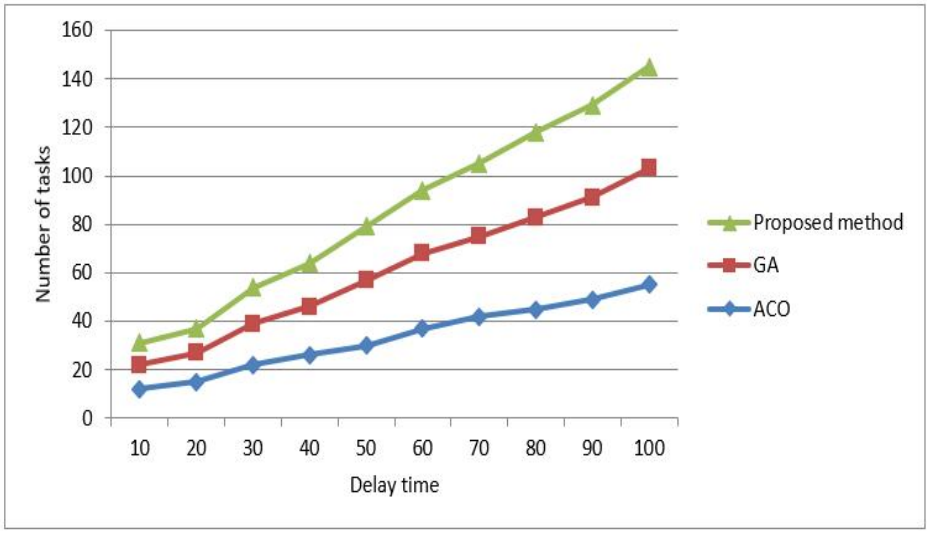

Figure 10. Comparison of the Suggested Method's Delay Time to the GA and ACO Algorithms

The delay periods of the offered methods are contrasted with those of ACO and GA in Figure 10. The latency of the suggested technique reduced as the number of jobs demonstrated that it performed better than the other two techniques.

Table 5. Statistics for Variable Features

Variable	Measurement Item	Standard Deviation	Variance	Skewness		Kurtosis	
				Statistics	Error	Statistics	Error
Anticipated Affirmation	CO1	0.780	0.606	-0.196	0.184	0.065	0.366
	CO2	0.805	0.647	-0.236	0.184	0.520	0.366
	CO3	0.846	0.725	-0.421	0.184	0.114	0.366
Perceived Usefulness	PV1	0.946	0.903	-0.286	0.184	0.126	0.366
	PV2	0.035	0.072	-0.410	0.184	-0.116	0.366
	PV3	0.942	0.903	-0.910	0.184	0.130	0.366

Satisfaction	SA1	0.956	0.916	-0.021	0.184	-0.040	0.366
	SA2	0.802	0.642	-0.524	0.184	0.750	0.366
	SA3	0.824	0.673	-0.862	0.184	0.400	0.366
Platform Trust	TR1	0.974	0.955	-0.556	0.184	0.350	0.366
	TR2	0.974	0.924	-0.809	0.184	0.810	0.366
	TR3	0.202	0.203	-0.084	0.184	-0.585	0.366
Direct Network Externalities	DNE1	0.672	0.445	-0.962	0.184	0.262	0.366
	DNE2	0.606	0.364	-0.497	0.184	-0.630	0.366
	DNE3	0.605	0.364	-0.600	0.184	0.308	0.366
	DNE4	0.653	0.423	-0.610	0.184	0.535	0.366
Indirect Network externalities	CNE1	0.275	0.175	0.870	0.184	0.150	0.366
	CNE2	0.995	0.985	0.610	0.184	-0.008	0.366
Continuous Use Behavior	CUB1	0.984	0.954	-0.640	0.184	0.014	0.366
	CUB2	0.957	0.914	-0.550	0.184	0.386	0.366
	CUB3	0.936	0.867	-0.685	0.184	-0.326	0.366

The outcomes are displayed in Table 5. All variables' absolute skewness and kurtosis values are less than 2, which satisfies the structural equation analysis's criteria for normal data distribution. The table displays the outcomes. As can be seen, the degree of confirmation suggests that the introduction of these new in this research has a favorable impact on perception usability and users' fulfillment since the standardization path coefficient through expected confirmations to perceived value is 0.80. The various leveled coefficient P is less than 0.01, the route coefficient from projected confirmation to client satisfaction is 0.45, and the significance coefficient P is less than 0.01.

5. Conclusion and Future Work

The experimental findings demonstrate that the continuous usage behavior analysis of the mobile information system under an edge computing-based knowledge payment platform is superior to that of the conventional knowledge platform, and the statistical indicators are complete. The border separating undergraduate and graduate education is used to categorize each level. In terms of gender distribution, there are 260 female respondents, or 50.6% of the total, compared to 254 male respondents, or 49.4% of the total. The ideal job allocation ratio is computed using the Ameliorate Harris Hawks optimization method in accordance with the MEC equipment's computation and communication capabilities. According to the experimental findings, 98 respondents to the questionnaire were under the age of 18, making up 19.1% of the total; 201 were between the ages of 18 and 29; 142 were between the ages of 30 and 39; and 73 were over 40, making up 14.2% of the total. The results show that the sample age is skewed towards younger people, with the concentration being strongest in the 18- to 29-year-old demographic, followed by the 30-39-year-old demographic. According to the performance results, the suggested strategy could effectively increase time, cost of energy, and current net worth. It outperforms ACO and GA in terms of performance.

According to predictions, science and technology will rule the world in the future, and mobile terminal development will follow suit. Every plan must be pushed because the daily lives of individuals and mobile devices will become increasingly intertwined.

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