Research on the Path of Administrative Efficiency Improvement in Public Management Based on Light GBM Model in the New Era

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Abstract

In this paper, a decision tree binary regression tree is set up based on the Light GBM model, the region of the tree is divided and the number of leaf nodes of the tree is iterated continuously. The regularization term controls the leaf node splitting and reduces the overfitting of the model to obtain the objective function of the model, the training data set is recorded as the loss function, and the objective function is optimized to optimize the loss function. The features with the maximum information gain are selected as the split nodes for information gain, and the model prediction accuracy evaluation index is determined to obtain the final model. The results show that the highest efficiency can reach 95% after the administrative management efficiency is improved, and the administrative management efficiency can be improved by strengthening administrative supervision in the new era.

Keywords: *light GBM model, binary regression tree, information gain, objective function, administrative efficiency*

Introduction

(Krasniqi, Tahiri, & Kolloni, 2020) With the continuous change of the social economy, public management work is also facing a complex market situation, the challenges facing its work are increasing, the work involves a number of subject departments, but also relates to the interests of different industries and different professional needs (Bevir & Rhodes, 2022; Birău, 2017; Vogel & Hattke, 2022). In this regard, the need to fundamentally improve the level and level of public management, so as to better meet the needs of the main body of multiple interests (Dovhan et al., 2021; Profiroiu, Sabie, & NASTACĂ, 2022). In order to effectively solve the various dilemmas faced by public management, it is necessary to be based on the synergistic perspective, innovate the public management model, scientifically apply the modernized public management model, improve the foresight and guidance of the public management model, and effectively play its advantageous role (Hergüner, 2021; Zyrianov, 2020).

Public management mainly refers to the government as the core of the public sector, to integrate all aspects of social forces, including political, economic, legal and other aspects, in order to provide protection for the people, but also to strengthen the government's ability to govern (Cinjel & Danjuma, 2020; Rachynska, 2019). From the point of view of the application of public management mode, public management mode depends on certain resources, but because of the limitations of the government's functions, it is unable to stably provide resources, and ultimately unable to ensure the scientific allocation of social resources (Newbold, 2020; Praks & Brkić, 2020). In carrying out relevant public management work, the application of its own resources cannot be accessed, resulting in greater difficulties in the management work (Akman & Powell, 2018).

Public management also requires the active participation of national public officials, the state has high standards and requirements for public officials, in order to better strengthen the quality and level of public management services, the most important need to focus on public management in the administrative management (Fedorchak, 2018; Todoruţ & Tselentis, 2018). Administrative management is mainly the State

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Council and local governments at all levels of national affairs and social public affairs, the main basis is the national laws and regulations, its main work includes administration, office, manpower and property accounting four aspects (Walker, Brewer, Lee, Petrovsky, & Van Witteloostuijn, 2019). However, in the process of the development of the new era, the quality and efficiency of administrative management in public management still need to be further improved, so it is particularly important to study it (Kushwaha, Panchal, & Sachdeva, 2020).

(Nwinyokpugi & Elizabeth, 2020) showed that traditional methods of organizational communication have become costly to the continuous improvement of administrative efficiency. The relationship between electronic communication and administrative efficiency in the banking industry in Rivers State was investigated by using convenience sampling method to select 14 accessible banks and raw data were extracted from several positive respondents for reliability test. The result was obtained that there is a significant positive correlation between the dimension of electronic communication and the administrative efficiency measure of the industry under study (Zubchyk & Kamiran, 2019) addressed the field of public administration in Ukraine, where organizational culture affects administrative efficiency and is therefore considered an important factor in the formation and improvement of the competitiveness of firms. Public administration views administrative efficiency differently as a social platform for employing citizens. As a result, many problems of public management such as administrative inefficiency, unreasonably large costs and losses become a burden on the public budget.

(Stroińska, 2020) tested the collaborative creation platform for improving administrative efficiency, providing a theoretical background for conducting empirical research on institutional changes in administrative efficiency improvement in public management. The results of further research explorations will be presented in the form of a research report on the concept of New Public Management, which is based on a change in the direction of management in public organizations, including a move away from an approach that focuses exclusively on procedural and behavioral rules related to expenditures. Instead, rules based on the analysis of expenditure results are implemented, a strategic orientation is adopted, and market mechanisms are introduced in the provision of public services. A systematic study of the relevant discourses has been conducted by Andrikopoulos, V. P et al. who explored the principles and methods of New Public Management and New Public Governance (Andrikopoulos & Ifanti, 2020). Analysis of the data shows that these theoretical schemes continue to emphasize the prioritization of management over public services. As a result, the New Public Service approach was revisited, focusing primarily on the reinterpretation and reorientation of efficiency gains in public administration. This study enriches theoretical and practical understanding and provides important reflections and insights into the organizational conditions of public sector reforms underway today (Annan-Prah & Andoh, 2023).

(Pollifroni, Militaru, & Ioana, 2016) illustrate that effective management of public administrations can enhance administrative efficiency as well as administrative transparency, evidence that is now increasingly seen in the practices adopted by public administrations on their websites (Jordan, 2019). A quantitative analysis of the different Italian public sectors shows that administrative efficiency can be seen not only as a tool for controlling public expenditure, but also as an important means of improving administrative transparency. The results show that administrations that have been pursuing policies oriented towards administrative efficiency are the most viable when it comes to open government (Gan et al., 2021; Safan, Murillo, Wadhera, & Castillo-Chavez, 2018).

In this paper, a framework for administrative efficiency improvement is constructed, and a binary regression decision tree is built based on the LightGBM model, which delineates the region of the tree as well as the complexity of the tree. In order to make the improvement path identification results close to the real results, iterate each calculation process continuously, seek the decision tree to minimize the value of the objective function, and calculate the loss function. The leaf node splitting is controlled to get the objective function of the model, the constant term is removed and the loss function term is optimized. Each leaf node of each tree is merged, gradient iteration is performed, and the feature with the maximum information gain is selected as the split node, and the information gain after the split is measured by the variance after the split. In order to seek the best cut-off point to determine the prediction accuracy of the decision tree, the optimal solution of the model is derived. The experimental results show that the new era should fully recognize the importance of improving the efficiency of administrative management to achieve the ultimate goal of work management, and improve the level and efficiency of administrative management by increasing the

frequency of training of the management team, streamlining the department, and innovating the mechanism.

Administrative efficiency enhancement framework

With the development and change of the times and the promotion of the administrative management system reform, the current administrative management mode has long been unable to meet the basic demands of the new era to improve the efficiency and serviceability of administrative management, which limits the basic functions and role of administrative management. For government departments to carry out public management work, the fundamental goal is to serve the people, for the benefit of the masses, so that people enjoy the dividends of reform and opening up. With the sustained and stable development of social economy in the new era, the government plays a leading role in public management, thus the importance of administrative management is becoming more and more prominent. Under the current economic and cultural development situation, government departments should optimize administrative management, integrate administrative resources, and improve the administrative efficiency of the government.

Figure 1 shows the framework of administrative management efficiency improvement, and the administrative management in public management takes the people as the working object and serves the people as the ultimate goal. The relevant government departments are prompted to improve the efficiency of administrative management by optimizing the allocation of resources and improving the relevant mechanisms, which lays the foundation for expanding its positive influence on the economic and social as well as cultural prosperity and development. Administrative management is under the leadership of government departments to provide services and assistance to people in the public sphere, such as economy, culture, employment, health, medical care and other fields, so that people can enjoy a higher standard of living. Strengthening administrative management in public management can have an impact on politics, economy, law and many other aspects, which can not only restrain the public officials and improve the service and execution ability of the managers, but also better implement the national policies, make some public welfare services to better meet the needs of the masses, and enhance the people's acceptance of the administration, which can play a role in the impact of the administration in public management and safeguard the interests of the people. The impact of public management, to protect the interests of the people (Fruehwirth et al., 2020).
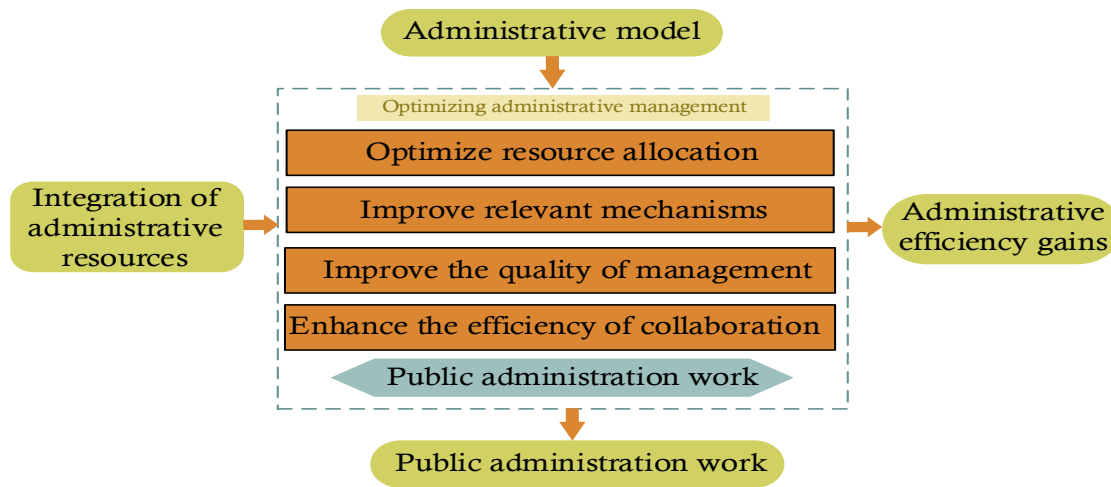
Figure 1: Administrative efficiency improvement framework

Predicting administrative efficiency improvement paths based on Light GBM modeling

Calculate administrative efficiency

Light GBM is an improved gradient boosting decision tree model proposed by Microsoft, which solves the problems of slow training speed and large memory consumption of the traditional gradient boosting decision tree model in the face of large amount of data and high feature dimension (Guo, Li, & Xu, 2021). It is widely used to deal with classification and regression problems due to its advantages of high efficiency, speed and parallelism, which can ensure better classification and prediction results while possessing a higher

accuracy rate. In this paper, we analyze the prediction of administrative efficiency improvement path in public management based on Light GBM model. Light GBM achieves the final prediction by linearly summing the prediction results of multiple decision trees, and the model algorithm is as follows:

The known datasets $T = \{(x_1, y_1), (x_2, y_2), \cdots, (x_N, y_N)\}$, $x_i \in X \subseteq R^n$, $y_i \in Y \subseteq R$. x_i are n-dimensional feature vectors, X is the input space, y_i is a one-dimensional label, Y is the output space, and N is the number of samples.

Taking the regression problem as an example, the decision tree at this point is a binary regression tree and the Light GBM model can be expressed as:

$$f_M(x) = \sum_{m=1}^{M} T(x; \Theta_m) \qquad (1)$$

where $\sum_{m=1}^{M} T(x; \Theta_m)$ denotes a single binary regression tree, Θ_m is the parameter of the tree, and M is the number of trees.

If M is divided into J mutually independent regions $R_1, R_1, \cdots, R_J$, for each of which corresponds to a definite output value c_j, then the regression tree can be expressed as:

$$T(x; \Theta_m) = \sum_{j=1}^{J} c_j I(x \in R_j) \quad (2)$$

In equation (2), parameter $\Theta = \{(R_1, c_1), (R_2, c_2), \cdots, (R_J, c_J)\}$ is the division region of the tree and the output value on the corresponding region, and J is the complexity of the tree, i.e. the number of leaf nodes of the tree.

The ultimate goal of the model is to make the administrative efficiency improvement path recognition results close to the real results, so in each iteration process to find the decision tree to minimize the value of the objective function, where the objective function includes two parts of the loss function and the regularization term, the loss function is calculated as:

$$L(y_q, y_q') = \frac{1}{A} \sum_{q=1}^{A} (y_q \lg P_q + (1 - y_q) \lg(1 - P_q)) \qquad (3)$$

where $L(y_q, y_q')$ is the loss function, y_q is the true category corresponding to independent variable X_q, y_q' is the category identified after inputting independent variable X_q, A is the input sample size, and P_q is the probability of identifying independent variable X_q as category 1 after inputting it into the model.

The regularization term reduces the overfitting of the model by controlling the leaf node splitting, which is the objective function of the model:

$$O = L(y_q, y_q') + \gamma Z + \frac{1}{2} \lambda \sum_{v=1}^{Z} (W_v)^2 \qquad (4)$$

where O is the objective function, Z is the number of leaf nodes, W_v is the output value of the vth leaf node, and γ and λ are set parameters. Compared with the traditional gradient boosting algorithm, the LightGBM model is improved to a decision tree algorithm using histograms and combined with a depth-constrained leaf growth strategy, which enables it to obtain higher accuracy and computational speed. And the model uses a one-sided gradient sampling algorithm to calculate the weighted information gain by increasing the weight of large gradient samples and decreasing the weight of small gradient samples.

Training dataset $T = \{(x_1, y_1), (x_2, y_2), \cdots, (x_n, y_n)\}$, empirical loss function $l(y_i, \hat{y}_i)$, regularization term $\Omega(f_k)$, output strong classifier $\hat{f}(x)$. The overall loss function can be written as:

$$L(\phi) = \sum_i l(y_i, \hat{y}_i) + \sum_k \Omega(f_k) \quad (5)$$

$$\hat{y}_i = \sum_{k=1}^{K} f_k(x_i) \qquad (6)$$

where $\sum_k \Omega(f_k)$ denotes the complexity of k the tree. $L(\phi)$ is the expression on linear space, i denotes the ith sample, k denotes the kth tree, and $\hat{y}_i$ denotes the predicted value of the ith sample x_i. Since $\hat{y}_i = \sum_{k=1}^{K} f_k(x_i) = \hat{y}_i^{t-1} + f_t(x_i)$, then $L(\phi)$ is transformed into the following form:

$$L^{(t)} = \sum_{i=1}^{n} l\left(y_i, \hat{y}_i^{(t-1)} + f_t(x_i)\right) + \sum_k \Omega(f_k) \quad (7)$$

Next, the objective function is optimized with a second-order Taylor expansion that removes the constant term and optimizes the loss function term. The general Taylor expansion formula is as follows:

$$f(x) \approx f(x_0) + f'(x_0)(x - x_0) + \frac{f''(x_0)}{2}(x - x_0)^2 \qquad (8)$$

Assuming $f(x) = l(y_i, x)$, a second-order Taylor expansion for $l(y_i, x)$ at x_0 is obtained:

$$l(y_i, x) \approx l(y_i, x_0) + l'(y_i, x_0)(x - x_0) + \frac{l''(y_i, x_0)}{2}(x - x_0)^2 \qquad (9)$$

Since the structure of the $t - 1$ tree has been determined, the only parameters required in the objective function at this point are the parameters of the tnd residual tree, with respect to $f_t(x)$ and the model complexity defined as follows:

$$f_t(x) = \omega_{q(x)}, \omega R^T, q: R^d \to \{1, 2, \ldots, T\} \qquad (10)$$

$$\Omega(f) = \gamma T + \frac{1}{2}\lambda \sum_{j=1}^{T} \omega_j^2 \qquad (11)$$

Where, ω denotes the value of each leaf node or the weight of each leaf node for each tree, $q(x)$ denotes the mapping relationship from samples to leaf nodes, $\omega_{q(x)}$ denotes the predicted value of the residuals of the tth round, and T denotes the number of leaf nodes. Finally, the primary term coefficients are merged and the secondary term coefficients, defined as follows:

$$G_j = \sum_{i \in I_j} g_i \qquad (12)$$

$$H_j = \sum_{i \in I_j} h_i \qquad (13)$$

where G_j denotes the accumulation of the first order partial derivatives of the samples contained in node j and is a constant. H_j denotes the cumulative second-order partial derivatives of the samples contained in node j and is a constant.

Forecasting Administrative Efficiency Improvement Accuracy

The principle of Light GBM model is to map the continuous floating-point feature values into k discrete value, and then construct it into a histogram of width k, that is, to do the segmentation function for the value of each feature, dividing the value of all samples on the feature into a certain segment, and finally transforming the value of the feature from a continuous value to a discrete value. Figure 2 shows the flowchart of Light GBM model, firstly, the dataset needs to be feature normalized, secondly, the initial value of gradient is calculated and then the tree is built. It is necessary to repeat the steps of calculating the histogram, calculating the split features, establishing the root node, and slicing the samples under the condition that the maximum number of nodes is not greater than the leaves or the leaves can still be split. The process of tree building continues to be repeated after updating the gradient value of the tree until all the trees are built.
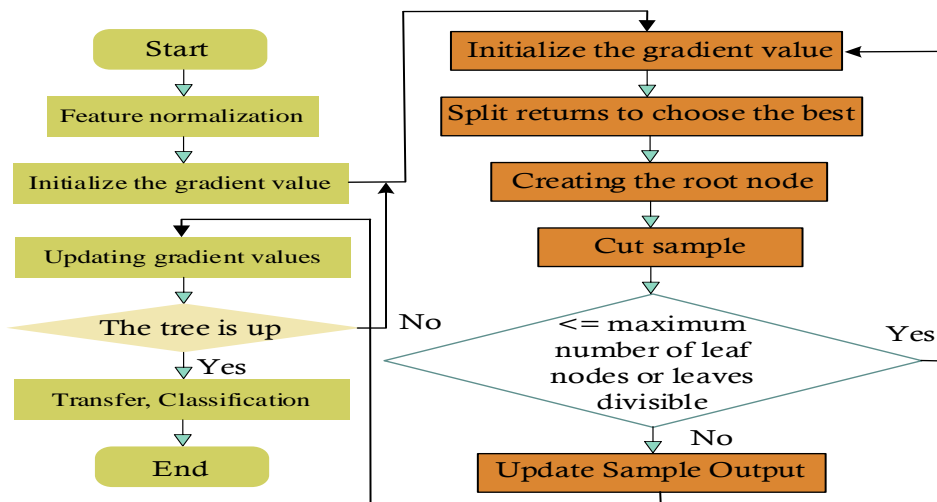

Figure 2: Flowchart of Light GBM model

Assume an independent identically distributed dataset of dimension n if $\{x_1, x_2, \cdots, x_n\}$, where each is a vector with latitude s in space χ^s. During the gradient iteration, the negative gradient of the model loss function output is denoted as $\{g_1, g_2, \cdots, g_n\}$. The model selects the feature with the largest information gain as the split node. It is common to measure the information gain after splitting by the variance after splitting.

Suppose the training set on the fixed node of the decision tree is O. The variance gain of the split feature j of this node at point d is defined as:

$$V_{j|O}(d) = \frac{1}{n_0}\left(\frac{\left(\Sigma_{\{x_i \in 0; x_j \leq d\}} g_i\right)^2}{n_{l|O}^j(d)} + \frac{\left(\Sigma_{\{x_i \in 0; x_{ij} > d\}} g_i\right)^2}{n_r^j(d)}\right) \qquad (14)$$

In equation (14), $n_O = \sum I[x_i \in 0], n_{l|O}^j(d) = \sum I[x_i \in 0; x_{ij} \leq d]$.

For feature j, the decision tree algorithm calculates the information gain of each node, and then the node that achieves the maximum gain is selected, and then the data at that node is partitioned into a left sub-node and a right sub-node according to the feature. In Light GBM model, firstly, the training samples are sorted according to the absolute value of the gradient from largest to smallest, and then, the $top - a \times 100\%$ data set with larger gradient is kept to get the data subset A. For the remaining $(1 - a) \times 100\%$ set of training samples with smaller gradient A^c, a subset of size $b \times |A^c|$ is randomly sampled B. Finally, the data is partitioned according to the estimated variance gain $\tilde{V}_j(d)$ of the subset.

Light GBM, in order to seek the optimal cut-off point, first traverses the decision tree and accumulates the gradients S_L and quantities n_L of all left nodes to obtain the gradients and quantities of the right nodes as:

$$S_R = S_P - S_L \quad (15)$$

$$n_R = n_P - n_L \quad (16)$$

The evaluation index of deterministic prediction accuracy of the model in this paper is:

$$e_{MAE} = \frac{1}{n}\sum_{i=1}^n|\hat{y}_i - y_i| \quad (17)$$

Where, n is the number of predicted samples, y_i and $\hat{y}_i$ are the true and predicted values of the ith sample. The final model can be obtained by updating the regression tree through several iterations.

Light GBM is an improved model based on the decision tree framework, which uses a histogram-based segmentation algorithm to replace the traditional pre-sorted traversal algorithm, which is not only better than the decision tree in terms of training speed and spatial efficiency, but also effectively prevents overfitting, which is more suitable for the study of the path to improve the efficiency of administrative management.

Path analysis of administrative efficiency improvement in public management

Evaluation of model accuracy

In order to validate the accuracy of the Light GBM model in this paper, a grid search method is used for tuning four main parameters learning rate, number of iterations, number of leaf nodes, and depth of the tree. On the training dataset, multiple iterations were performed and a 5-fold cross-validation method was used to determine the best parameters to use for prediction in the training phase. Individual features were sorted in order of absolute value and 10%, 20%, 30%, 50% of the total number of features as well as selected non-zero features were used as inputs, respectively. Where, Light GBM represents the input as all features and others in that order and Light GBM_nonzero represents the input features as the features whose data value is not 0. Table 1 shows the accuracy evaluation metrics of the prediction results, relative to the results without data feature screening, the model basically improves in all metrics when the number of screened features is 30%, 50% and when the screened features are nonzero. And when the number of features is 20%

and 10% of the original number, the model becomes worse in all the indicators except for the improvement in training time. It can be concluded that when the number of filtered features is similar to the number of data values that are non-zero, the model's prediction is better than the original model and more accurate.

Table 1 Light GBM model prediction accuracy evaluation indexes

Model indicators	RMSE	MAE	DC	KGE	TIME
Light GBM	3385	2283	0.852	0.922	0.05
Light GBM_nonzero	3270	2254	0.843	0.922	0.02
LightGBM_10	3495	2360	0.822	0.897	0.02
LightGBM_20	3376	2315	0.835	0.904	0.02
LightGBM_30	3274	2313	0.847	0.922	0.03
LightGBM_50	3281	2307	0.846	0.915	0.03

Administration in public management has an important role to play, and has an important impact on the people and society, but in the development of the new era, with the strengthening of national strength and social comfort, some of the administrative work has been gradually watered down, and a number of more serious problems have arisen. At present, the most important problem of administrative management in public management is that the establishment of departmental organizations is not reasonable enough. One of the important elements of administrative management is to do a good job in the dissemination of information about the enterprise organization, this work contains two important aspects. First of all, the administrative management department needs to send the information conveyed by the higher departments and the tasks assigned to the corresponding departments at lower levels, and urge the lower departments to do a good job in the distribution and implementation of the work. Secondly, the administrative department needs to transmit and release all kinds of administrative contents and information from the same level department and the lower level department. Table 2 shows the evaluation of factors affecting the improvement of administrative efficiency in public management, in which the maximum value of the indicator of organizational structure to be optimized is 5.65 and the average value of the indicator of unclear responsibilities between some departments is 3.35. The improvement of administrative efficiency is related to the responsibilities and scope of work of each department, and it is necessary to incorporate the administrative management into the public management system, and to actively conduct reforms and innovations based on the Light GBM model. Reform and Innovation. In order to further realize the functions of public management, it is necessary to ensure the effective implementation of national policies by improving administrative efficiency and integrating relevant laws and regulations. If administrative efficiency is relatively low, it will not only affect the implementation of policies, but also affect social stability. In order to accept the work of the administrative departments, it is necessary to take efficiency as an important element in measuring the results of their work. In this way, it is necessary to ensure that each department coordinates with each other in order to truly improve the efficiency of administrative management (Miller, 2019).

Table 2 Evaluation of factors affecting the improvement of administrative efficiency

	Maximum values	Minimum value	Average value
Organizational structure to be optimized	5.65	2.68	4.22
General quality of management is average	5.45	2.89	4.20
Unclear responsibilities between some departments	4.98	3.12	3.35
Inadequate management system	4.87	3.35	3.87
Administrative technical issues	5.33	2.97	4.15

Administrative efficiency score

This paper selects 12 months in 2022 to rate the administrative management efficiency improvement of an enterprise, Figure 3 shows the evaluation of the administrative management efficiency improvement path, which was rated 4.5 points in January and February, and rose to 9.5 points in December. The introduction of a new public management concept in the administrative management department not only clarifies the direction of reform and reform ideas, but also learns from successful experiences. Learning from successful practices, the functions of the department will be improved and optimized, and the deficiencies at the present stage of work will be corrected in a timely manner. The staff of the administrative department will further understand the necessity of the implementation of the new public management in practice, change

the traditional ideological concepts, treat the work with a sense of responsibility, and establish the consciousness of serving the society and the people wholeheartedly. Do a good job in the administrative management of enterprises in the context of the new era, is conducive to smooth communication channels between the upper and lower levels, to ensure the normal implementation of the work of the enterprise, and to play a good role in the enterprise management of the link.
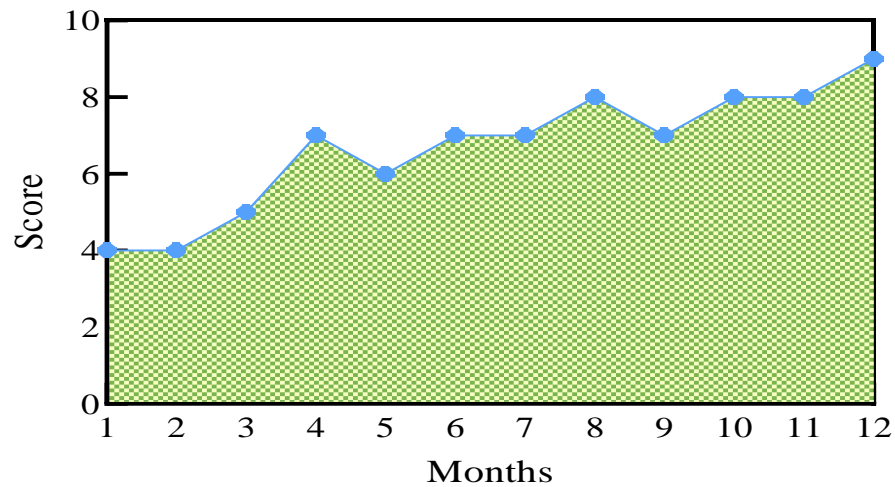

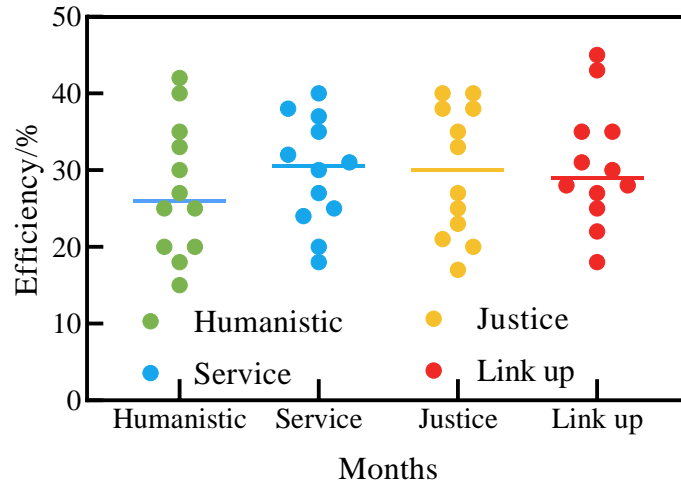**Figure 3:** Evaluation of administrative efficiency improvement path

Evaluation before and after upgrading

Administrative management involves many fields and has a wider and more lasting impact, for example, administrative management covers political, economic, cultural and health care, etc., which directly affects the happiness index of the people's life. The improvement of administrative efficiency in the new era of public management includes the principle of people-oriented, public service principle, the principle of fairness and justice, and the principle of collaboration and communication, and in the process of improving administrative efficiency, it is necessary to implement the above principles. The administrative efficiency under public management in 2021 and the administrative efficiency of enterprises in 2022 are tested after the improvement of administrative efficiency, and Figure 4 shows the efficiency evaluation before and after the improvement of administrative efficiency in public management.
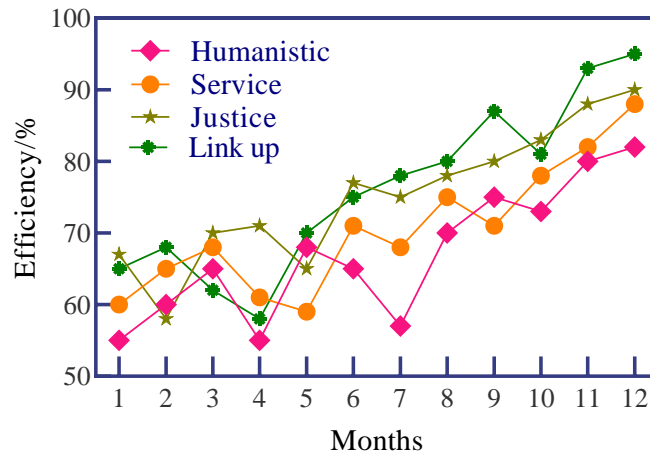
Evaluation of administrative management efficiency before improvement is shown in Figure 4(a), the overall administrative management efficiency in 2021 is low, and the efficiency under the principle of people-centeredness reached only 15% in January. There is a close connection between work efficiency and the content of work and work task allocation, so in order to improve the efficiency of administrative management, it should also pay attention to the reasonable setup of the organizational structure of the administrative management department. On the one hand, the workload should be reasonably distributed to ensure that the workload of each department is relatively equal, so as to be able to ensure the efficiency of the work done. On the other hand, in the organizational structure should also be set to avoid duplication of work distribution, the work between departments can be connected, but should avoid cross, so as to avoid duplication of work or shirking of responsibility, to avoid the existence of the phenomenon of kicking the ball, which will be able to effectively improve the efficiency of administrative management.

After the evaluation of administrative management efficiency improvement, as shown in Figure 4(b), after the administrative management efficiency improvement based on Light GBM model, the maximum efficiency in December 2022 can reach 95%, compared with December 2021, an increase of 50%. At present, in the context of the development of the new era, people's ideological concepts are constantly changing, and some administrative managers also have new innovative ideas. In this regard, on the one hand, professional guidance should be given to administrative managers according to the development of the times, and the quality of administrative managers should be cultivated based on the Light GBM model, so as to guarantee their enthusiasm for service and the level of service. On the other hand, the institution should also pay attention to the guidance of the ideological concepts of administrative managers, to avoid more personnel think that the rights are greater than the obligations, and feel that the unit is an iron rice bowl, thus relaxing the work. The unit should be real-time guidance, regular thought guidance,

fundamentally guarantee the correctness of the administrative management personnel thought, so that can continue to improve the quality and ability of the administrative management personnel, but also can effectively enhance the efficiency of the administrative work in public management. In addition, the relevant units can also set up the corresponding reward and punishment system, so as to administrative management personnel to motivate, improve the enthusiasm of administrative personnel, which can be conducive to the effective enhancement of the efficiency of administrative management in public management.

(a) Pre-evaluation of administrative efficiency gains

(b) Post-evaluation of administrative efficiency gains

Figure 4: Pre- and post-evaluation of administrative efficiency improvement

Discussion

Future research can further deepen the optimization and validation of the Light GBM model and explore more effective parameter tuning methods to improve the predictive performance and stability of the model. In addition, comparisons can be made with other machine learning algorithms to determine the best prediction model. Public management involves multiple departments and fields, and future research can explore how to effectively integrate data from different departments to construct more comprehensive datasets, so as to more accurately assess the efficiency of administrative management and provide more targeted policy recommendations. Data privacy and security issues become particularly important in the process of data mining and model training. Future research could also explore how to better utilize data for analysis and modeling while safeguarding data privacy.

Conclusion

This paper is based on the Light GBM model to test the model prediction accuracy under different number

of features, and iterating on the training data set, after the data feature screening results in a higher model accuracy, and a higher accuracy in the study of the administrative management efficiency improvement path. The factors affecting the improvement of administrative efficiency in public management are evaluated, in which the maximum value of the index of organizational structure to be optimized is 5.65, the highest. Evaluating the efficiency before and after the administrative efficiency improvement in public management, after the administrative efficiency improvement based on Light GBM model, the maximum efficiency can reach 95% in December 2022, which is 50% higher compared with that in December 2021. Therefore, in the new era of administrative management in public management, it is necessary to pay attention to the improvement of administrative efficiency, strengthen the personnel management of the administrative management department, so as to improve the administrative managers' ability and efficiency.

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