

# Research On the Development of Intelligent Face Recognition System for Business Competition in Chatgpt Industry

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**Abstract.** Artificial intelligence has become a key area of today's international competition. Analysis of the development trend of artificial intelligence and the strategies of major powers is crucial to winning this competition. This paper refers to (GCN) and Laplace's (LBP) feature equation in ChatGPT. Firstly, an image processing method based on LBP is proposed. GCN analyzes the temporal and spatial correlation of character attributes in the time domain. This method can capture both short-term and long-term temporal and situational correlations simultaneously, effectively improving the extraction of temporal and situational correlations. Then, text analysis determines the implementation intentions, measures and prospects of the EU's "human-centered" artificial intelligence competition strategy. It also evaluates its strategic effects from the relevant reactions of its main competitor, the United States, and infers the weaknesses and risks existing in the strategy.

**Keywords:** Human Behavior Recognition; Face Recognition; Feature Extraction; ChatGPT; Graph Convolutional Neural Network; Laplace's Algorithm.

## 1. Introduction

Artificial intelligence has gradually become an unstable factor that significantly impacts human development. Whether in financial investment or technological development, China and the United States have occupied a clear "bipolar" position worldwide. The world's 70 largest Internet companies control many data and calculation methods required for AI technology, and China and the United States control 90% of their market value. But it cannot be ignored that the European Union is gradually becoming a new competitor. Since the European Artificial Intelligence Strategy was announced in 2018, a series of policies and laws have been proposed, making people wonder whether the EU will become another super AI power. First, the European Union has shown that it is trying to change the situation in which the "two poles" coexist and may evolve into a competition among the "three powers." The European Council has made it clear that it is unwilling to "choose sides" between China and the United States and actively requires itself to be a competitor and not to be used as an arena for others. Secondly, the strategic documents published by the European Union indicate that it is competing in a development style different from that of China and the United States based on its comparative advantages. The concept of "technological sovereignty" was advocated by Ursula von der Leyen. Its essence is to obtain the maximum possible benefits in infrastructure, tools, standards, laws and regulations, and the value and social paradigm related to critical technologies. Limit "regulatory autonomy," thereby gaining space for Europe to develop. Ultimately, given that the EU does have the values and public opinion to respect personal privacy and data-related human rights, coupled with the practical experience provided by the General Data Protection Regulation (GDPR), it can fully position the value of "people first" to surpass the power dominated by the Chinese government and the market dominance dominated by the United States, it took the lead in promulgating a set of ethics on artificial intelligence and promoted it to the world, trying to use the European model to "overtake." Because the issue of artificial intelligence is related to the balance of power among several significant countries in multiple dimensions such as science and technology, economy, and society, it is indispensable to continue to track and analyze the international competition situation in artificial intelligence at each national level. The EU is a significant factor that cannot be ignored when studying and judging the global artificial intelligence competition landscape.

Due to the influence of illumination, posture, expression and age, the structure of the human face has nonlinear changes. Traditional linear dimension reduction (PCA) can not deal with it effectively, but manifold learning technology is used to deal with it effectively. There are two standard nonlinear manifold learning algorithms: one is based on a global nonlinear manifold learning algorithm, and the other is based on local linear embedding, Laplacian feature mapping. The geodesic distance is replaced by Euclidean distance in the high-dimensional scaling algorithm, and the equidistant embedding function is found so that the whole optimization of the high-dimensional scaling algorithm is realized. Local Logistic embedding refers to the local Logistic property of low-dimensional manifolds [1]. The geometric features of the local area can be preserved under translation, rotation, expansion and other transformations. Some researchers put forward the idea of nuclear adjacency preservation, which approximates the traditional idea of local linearization with a new linearized transformation matrix and solves it in higher dimensions using the nucleon algorithm technique. Laplacian feature mapping uses Laplacian operators to describe some properties of manifolds, thus solving the problem of low-dimensional steganography with distance dependence [2]. For the Laplacian feature graph, some people have proposed a "locally protected" linear approximation method to obtain the feature graph. The algorithm quickly realizes the effective matching of low-dimensional data, retains the Laplacian local characteristics, and has strong robustness. A feature function with local Laplacian features has been obtained by reconstructing adjacent graphs. The human body is divided into different regions according to parts, and the local information of facial expressions is fused in each region to explore the information co-occurrence. The image convolutional neural network in the adaptive ChatGPT is used to extract each facial expression. A comprehensive facial expression inference model is formed by combining two different types of facial expressions to realize a comprehensive understanding of facial expression.

Meanwhile, the emotion feature extraction method is studied based on a multi-level extended time domain convolutional neural network. In this method, the perceptual outfield value of each layer is increased by layering so that both short-term and long-term associations can be captured [3]. In this way, the method can extract the situational dependence in the emotion sequence more comprehensively, thus improving the inference ability of the method. At the same time, this article comprehensively sorts out the implementation intentions, measures and prospects of the EU's artificial intelligence strategy, evaluates its strategic effects from the relevant reactions of its main competitor the United States, infers the weaknesses and risks in the strategy, and helps China cope with new competition. Provide advice on situations.

## **2. Text analysis of the competitive strategies of the artificial intelligence industry in European countries**

### **2.1. Strategic text arrangement**

Since the formal promulgation of the European Artificial Intelligence Strategy in the same year, it was shown for the first time that the EU will generally determine its global competitive position in the field of artificial intelligence and the position of the two major powers China and the United States in accordance with European value standards. During the period 2018-2021, the European Council published 5 strategic articles on the topic of artificial intelligence. Although the "Ethical Guidelines for Trustworthy Artificial Intelligence" were not directly promulgated by the European Council, it was co-written by 52 top scholars organized by the European Council. The report also comes as the ad hoc think tank helped the European Council to derive a set of competing directions for its AI strategy during its two-year work and proposed a practical path for its implementation.

## **2.2. Competitiveness Strategy Characteristics**

### **2.2.1 Competitive position**

Develop "human-centered" artificial intelligence technology. Some scholars have proposed positioning theory based on the concept of "selecting a combat location" in the military. They emphasized that they should prevent competitors from becoming strong in consumers' minds or make full use of the shortcomings contained in their strength to establish their own brand's advantageous position. From this perspective, Europe's AI strategy is to try to avoid the advantages of China and the United States in cutting-edge AI technology when determining its own goals so that European AI becomes "reliable" in the eyes of the public. Europe has set its competitive goal of creating "human-centered" artificial intelligence. Stanford University and MIT in the United States first proposed the concept of "human-centered AI." They believe that AI is not just a technology but a humanistic, ethical, beneficial, and capable of empowering human beings. Power is not something that replaces humans. However, in the process of integrating this concept into its competitive strategy, the European Union was the first to integrate this concept into its own competitive strategy. It emphasized the moral and ethical aspects of this concept. It will significantly improve the lives of its people on the basis of protecting and respecting basic human rights and values while also playing a positive role in social and economic development. Furthermore, the European Union also wants to make the European Union, together with its member states, a global leader in human-centered artificial intelligence. This reflects the internal logic of Europe's competition model: first, human-centered artificial intelligence should be consistent with the core values of the European Union. As the "Lisbon Treaty" states, the European Union should respect human dignity, freedom, democracy, and equality based on the rule of law and respect the rights of all people, including ethnic minorities. This value concept should fully penetrate into the development and application of artificial intelligence technology and systems; secondly, it should be consistent with Europe's central values and easily gain the trust of European users, thus establishing trust among member states. Common market; thirdly, to determine whether the humanization of AI is consistent with the EU's values, it is necessary to establish a series of ethical norms and evaluation systems and elevate them to the level of law, thereby establishing a regulation in the European market barriers.

### **2.2.2 Competitive strategy**

Build a trustworthy and secure artificial intelligence regulatory system. Establish a global competitive strategy for human-centered artificial intelligence in Europe. The "Artificial Intelligence White Paper - A European Path to Excellence and Trust" ("Artificial Intelligence White Paper") sets out a rule for management: a new management system must be able to achieve its goals efficiently, but it cannot be "micromanaging"., let alone bring additional pressure to small and medium-sized enterprises. To this end, the new regulatory framework should be risk-oriented, that is, classifying artificial intelligence applications based on risks and adopting different ex-ante regulations.

### **2.2.3 Build an enabling environment**

For this competitive strategy to work, the European Union will focus on the following three areas:

The first is to establish a unified data space and lay a solid theory for it. Basics The EU must further eliminate internal market barriers in the digital field in order to form a synergy to participate in international competition. The "European Data Strategy" (EU) attached to the "Artificial Intelligence White Paper" points out the construction of a unified EU data space, that is, a truly unified data market, so that global data can enter the EU while ensuring the security of personal and non-personal data. It has achieved the efficient implementation of legislation in European countries and made all data-based products and services comply with the relevant standards of the European integrated market. In the policy document on artificial intelligence published by the European Union, although there is no clear definition of "data space", the European think tank "Big Data Value Alliance" gave an explanation: "Data space" is a space related to A general term that matches data models, data sets, ontologies, data sharing contracts, specialized management services, and their

surrounding flexible, competitive capabilities. This function is to maximize the use of data storage and exchange mechanisms in accordance with the method of data engineering so as to maintain, generate and share new knowledge. The EU obviously wants to establish a complete data storage, processing, sharing and service ecosystem in Europe and be "self-sufficient".

The second is the pilot work under the leadership of the government and demonstration and application. In order to highlight the competitive position of "human-centered" artificial intelligence in the global market and give the public a higher sense of recognition of reliable artificial intelligence technology and systems, European countries have emphasized in multiple strategic documents that in the economic, social and environmental fields, artificial intelligence can use its more intelligent analysis capabilities to better understand the real processes in the economic, social and environmental fields, so as to better provide high-quality services to the public. At the same time, the EU also requires member units to explore and demonstrate trustworthy AI technology in all aspects of government and society. The Artificial Intelligence Coordination Plan proposes that EU artificial intelligence must occupy a strategic leadership position in areas of great influence. The public sector is one of the areas of great influence, and the public sector must become a pathfinder in the application of artificial intelligence.

The third is to find common opinions and unite together to increase influence. The European think tank, the European Union Foreign Affairs Committee, proposed that the EU should examine scientific and technological issues from an economic perspective for a long time and become more involved in the geopolitics of science and technology. Only in this way can it find the best solutions in the two major scientific and technological powers of China and the United States. The European Union's policy document states that it hopes to engage in dialogue with other countries that share common values by establishing laws and regulations on artificial intelligence. Its main feature is the European Union's intention to promote ethics for artificial intelligence in international governing bodies such as the United Nations, OECD, G7, G20 and others. The author also noted that in recent years, the OECD has frequently published articles to study the development of artificial intelligence in Europe, and in 2020, it established a database on AI strategies and policies around the world with the European Council to track its development trends. In addition, the European Union also proposed the Artificial Intelligence Coordination Plan, requiring member states to seek ways to carry out bilateral cooperation on artificial intelligence issues between member states and third-party countries. Through collaboration between member states, the European Union will also seek cooperation with technology companies, academia and other stakeholders. The EU understands very well that in order to effectively enhance Europe's strength, it must establish a structure that recognizes the EU's values and collaborates in a multilateral manner, and this structure is also a key lever that allows it to operate outside Europe. Greater impact on existing geographies.

### **3. Graph convolutional neural network based on ChatGPT**

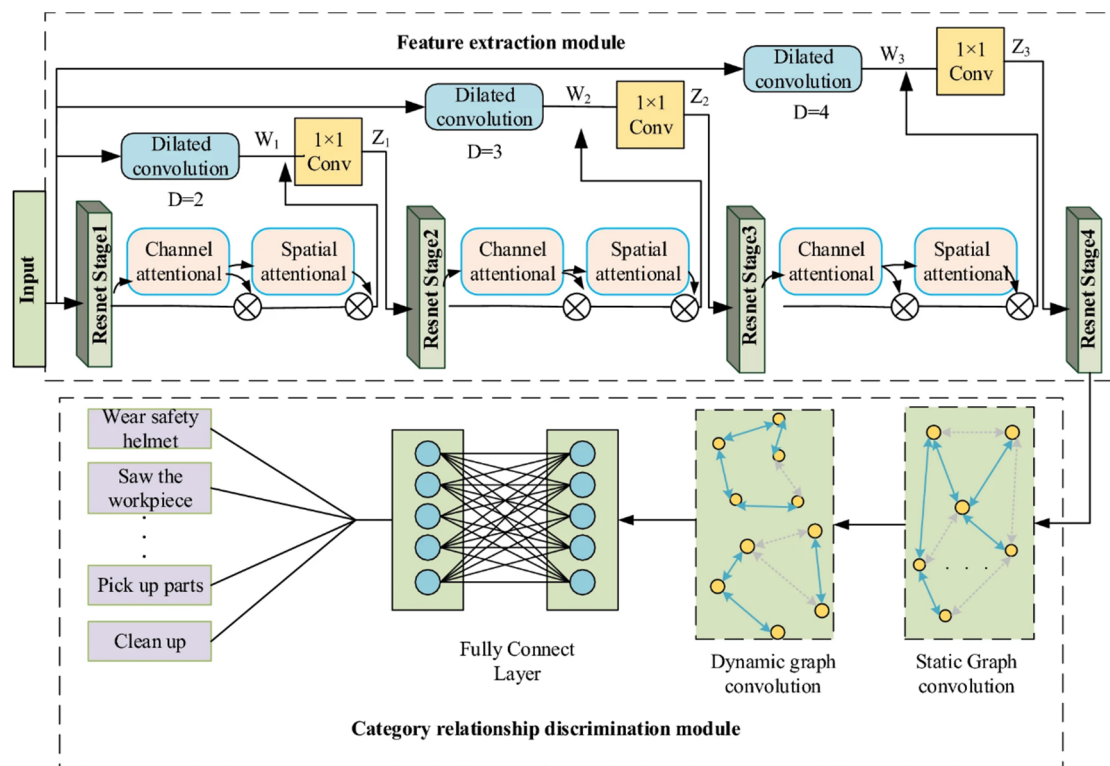
ChatGPT is a kind of automatic learning system with automatic generation ability, automatic recognition ability, communication ability, recognition, understanding of various meanings in natural language, and good learning ability. ChatGPT is an algorithm based on a large text library, which has a good effect on solving some complex natural language problems.

At present, ChatGPT has achieved good results. ChatGPT has been widely used in recommendation systems, and its performance is quite good. On this basis, this project intends to introduce ChatGPT into neural network to improve its learning efficiency. Laplace operator is a simple and effective method for constructing graph neural networks. It improves on the traditional graph neural networks and constructs a new graph convolutional network by embedding multiple nodes in a graph to solve the problem caused by sparse nodes in the graph convolutional network. Through the structure information of nodes or edges in the network, the characteristics of nodes or edges are expressed, so as to realize the classification and prediction of nodes or edges. Graph neural

network has important research value in natural language processing, machine translation, recommendation and so on.

Combining ChatGPT with the Laplacian operator will provide many new features and advantages:

This method makes use of the graph convolution property in graph convolution, so that it has better function of language understanding. Since graph convolutional networks have good performance in image classification, some problems faced by graph convolutional networks can be overcome effectively when they are applied to image classification. Some scholars have demonstrated that explicitly indexing expression types and expression frames into the model can enhance the semantics of behavior recognition tasks. Rough mixing of multiple models will result in a large difference in feature scale, which will affect the inference of the model. This project intends to use a multi-level perceptron to insert the multi-mode information into the high dimensional space, so as to eliminate the difference between the modes. Two levels of MLP accomplished by 1x1 convolution, this can be illustrated by Figure 1 below (Image cited in Dynamic graph convolutional network for assembly behavior recognition based on attention mechanism and multi-scale feature fusion).



**Fig. 1** Overall flow of the network model

$$h_{out} = \sigma(\gamma_2 \sigma(\gamma_1 h_{in} + b_1) + b_2) \quad (1)$$

Where :  $\gamma_1$  and  $\gamma_2$  are parameter matrices,  $b_1$  and  $b_2$  are bias vectors, and  $\sigma$  is ReLU activation function. Firstly, the action information of multiple users is obtained through balanced processing. Secondly, for the balanced training sample, the embedding space of the identified behavior is obtained by using the Laplace feature graph method [7]. The corresponding kinematic model is constructed by combining it with the existing training samples. A particle filter algorithm is used for behavior recognition.

An algorithm based on action equivalence is proposed for the samples collected from the same action of multiple users. In balance, the sequence of action length is obtained by deleting irrelevant information on both sides of the action and cross-copying key information. A new particulate filtration method is used after an action is discovered, empowering each action [8]. When the action is completed, the number of all the high-weight particles recorded from the start to the end is accumulated, and the action identification is carried out according to the embedding space with the

largest number of accumulated high-weight particles. The flow of behavior identification is shown in Figure 2 (the image is referenced from A Review of Human Activity Recognition Methods).

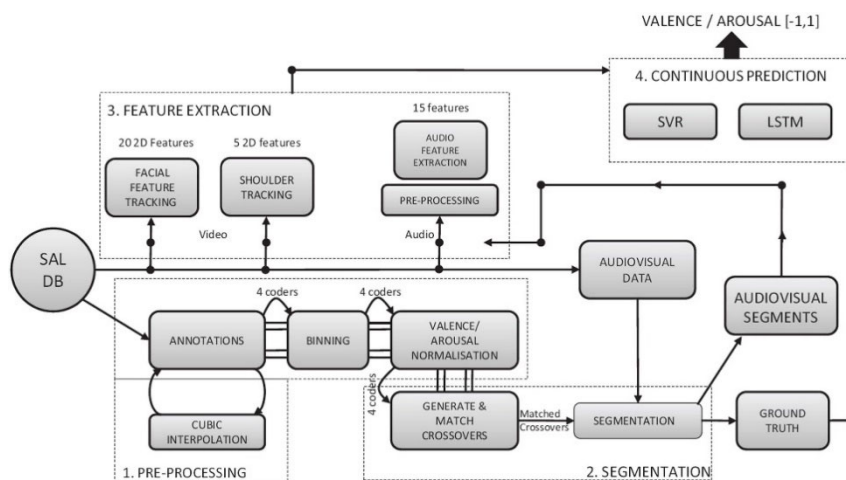


Fig. 2 Flow chart of facial expression recognition strategy

#### 4. Some suggestions for China's economic development

(1) In the fierce market competition, artificial intelligence companies should formulate corresponding strategies based on the actual situation of their country. The traditional "benchmarking" and "catch-up" ideas are not suitable for industrial technology competition on a global scale. The three major powers, China, the United States, and Europe, have adopted three different strategies on a global scale, and have launched a battle. The global race for artificial intelligence. When each country formulates its own strategy, its starting point should be based on the actual situation of its own country, and it should "look left and right" to establish its own strategy through games with real competitors. The reason why the European Union adopts a "human-led management approach" is that it puts the rights and interests of individuals at the center of the development of artificial intelligence and uses ethics and data sovereignty when countries such as the United States and China are in the lead. Advantages in other aspects can resist external threats to a certain extent. At the same time, it can also win more support for the establishment of Europe's digital unified market, the mature development of its own enterprises and technologies, and its alliances with other countries. Chance. China believes that win-win is a strategic prerequisite for sustainable development in the international AI field. With "open source and openness" as the core concept, the "New Generation Artificial Intelligence Development Plan" released in 2017 proposed to actively participate in the global research, research and management of artificial intelligence. And make optimal international layout for it. Only in this way will China have the opportunity to further expand the "cake" of international trade in the new century and major changes. China has adopted a competitive strategy of "government-led and all-round promotion". Its actions and goals cover various fields such as increasing R&D investment, cultivating talents, promoting industrialization, and solving security problems. It is considered to be the "most comprehensive National Artificial Intelligence Strategy". Given that China already has better AI applications and more and more user data, this "top-down" strategy will help China further strengthen its investment in AI and promote talents, enterprises, scientific research and data. The integration will form an AI industry that is in a leading position around the world and provide more opportunities for its development around the world.

(2) When conducting moral regulations on artificial intelligence, consensus needs to be reached through mutual games. Ethics can and are becoming a means to compete with artificial intelligence worldwide. The OECD Artificial Intelligence Principles were signed by other major countries, including Argentina and Brazil, in addition to the European Union. The G20 Ministerial Meeting adopted the "G20 Artificial Intelligence Principles" to promote national policies and international

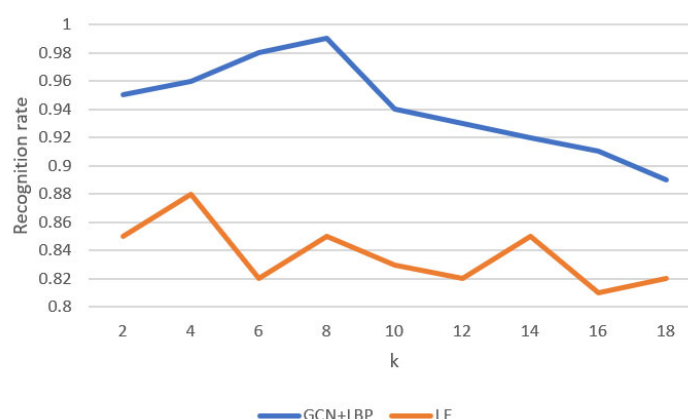
cooperation in establishing trustworthy artificial intelligence. In addition, the United States also published a document on "Regulatory Guidelines for Artificial Intelligence Applications." Although they are all non-statutory "soft laws" of ethical regulations, they show that ethical regulations are bound to be a trend in international competition in the field of artificial intelligence. Once the EU standards with first-mover advantages are mutually recognized by the wider region and truly become the global standard setter for artificial intelligence, they will constrain China's development.

(3) In the long run, efforts should be made to cultivate basic human qualities. From a development perspective, China should have a longer-term overall situation. When it promotes the development of AI, it should fully realize that the power of AI will inevitably penetrate into all areas of people's daily lives in an unpredictable form, thus causing serious moral problems, changes in social relations, and legal problems in people's lives and work. Judging from the actual situation of the EU, it occupies a considerable leading position in ethics. This is partly because European scholars and think tanks have been conducting in-depth thinking and discussion in the fields of technology and humanities. In this context, it is necessary for China to increase its research efforts in the humanities in AI.

## 5. Experimental results and analysis

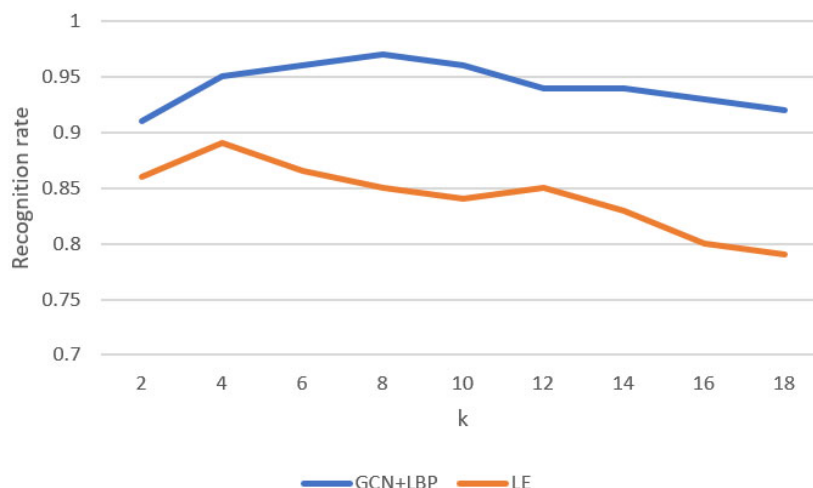
Using Yale and ORL face libraries, the recognition performance of the two methods and the selection of relevant parameters are tested and compared. The Yale Face library has 15 positive faces, each with different lighting and expressions, and each person will choose five as training subjects and the remaining six as test subjects [9]. The ORL Face library stores 40 positive faces with a variety of expressions and poses in the same light, and each person draws five, when the value of parameter  $k$  changes; the effect on the identification effect is shown in Figure 3. It can be seen from Figure 3 that LE algorithm obtains the maximum recognition rate when  $k=4$ . For  $k=6$  and  $k=8$ , GCN+ LBP is the best.

The results on the identification effect of the system. With the continuous increase of  $k$  value, the identification effect at a certain time interval. With the increase of  $k$ , the identification rate gradually decreases above a certain threshold and finally tends to be a constant [10]. At constant  $K$ -value, the classification performance of GCN+ LBP is much better than that of LE. In this round of experiments, it can judge the value of parameter  $k$  in LE algorithm and GCN+ LBP algorithm. In the following experiment, the value of neighborhood  $k$  of LE algorithm on Yale and ORL face library is 4, and the value of neighborhood  $k$  of GCN+ LBP algorithm is 6.



**Fig. 3** Influence of  $k$  value change on recognition rate

The influence of the change of parameter  $d$  value in the two algorithms on the recognition rate is shown in Figure 4. When  $d=40$ , LE is algorithm. When  $d=15$  or  $d=20$ , GCN+LBP algorithm gets the highest recognition rate.



**Fig. 4** Influence of k value change on recognition rate

It can be seen that the size of parameter d on the identification effect of the system. As the d value increases from the low-value region to the low-value region, there is a spike in recognition halfway [11]. With the continuous increase of d and greater than a certain threshold value, the recognition gradually decreases and tends to be stable. At constant D-value, the GCN+ LBP method has better identification performance than LE method.

Identification rate and classification identification time are two key factors in evaluating a method, and the results obtained by these two factors in the two methods are shown in Table 1. As can be seen from Table 1, on Yale and ORL face libraries, the recognition rate obtained by the GCN+ LBP algorithm is 99%, and at 98.5%, it is much higher than that obtained by LE algorithm. The classification and recognition time of the GCN+ LBP algorithm for a test image is 6.77ms and 7.5ms, which is basically controlled within 8 ms, which is comparable to LE algorithm. The facial feature extraction algorithm based on least square decomposition can discover the original information of the face more comprehensively so as to improve the recognition of the face. The SLE algorithm can obtain more accurate sample neighbors than LE algorithm by redesigning the labeling information of samples. Therefore, GCN+ LBP algorithm can obtain better recognition effect than the LE algorithm. This method has strong real-time performance and robustness and can significantly improve the correct recognition rate of images at a very low cost.

**Table 1** The average classification two algorithms

| algorithm name | Yale face library   |                         | ORL Face Library    |                         |
|----------------|---------------------|-------------------------|---------------------|-------------------------|
|                | Recognition rate /% | Identification time /ms | Recognition rate /% | Identification time /ms |
| LE             | 93.75               | 6.25                    | 95.31               | 7.40                    |
| GCN+LBP        | 99.54               | 6.77                    | 99.60               | 7.50                    |

## 6. Conclusion

The problem that the number of adjacent nodes is the same when constructing adjacent graphs is effectively overcome by using Laplace's property mapping. In addition, the particle dynamics model, observation model and particle filtering strategy in the constructed particle filter algorithm can better rate in the case of repeated actions, self-occlusion, and significant differences in the motion amplitude and speed of the tester. The artificial intelligence research community, the social science community with different cultural backgrounds, and artificial intelligence technical workers should work together to conduct in-depth research on basic theories from multiple perspectives such as human, cultural, global, traditional, and development. The development speed of artificial intelligence technology and whether it can reach the "other shore" are unpredictable. Therefore, to deal with the potential social problems caused by technology, it is necessary to establish an innovative theoretical system from

three levels: philosophy, society and science, and clarify wisdom. Generate internal logic to achieve active control of future development.

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