



The Analysis of Dynamic Realization Interest Balance of Intellectual Property

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Abstract. Intellectual property, as the right to protect the labor achievements created by human beings in social practice, is of great significance in today's rapid development of science and technology. Therefore, the intellectual property law was born, and gradually developed and improved according to the actual needs. In the digital age, data elements have become the core kinetic energy to drive the innovation and development of social economy. The scientific community has changed from traditional mode to digital mode, and the structure of knowledge growth has changed from mathematical rationality to information rationality. These digital changes of knowledge innovation inevitably bring subversive influence to intellectual property law. Therefore, the revision of intellectual property law has become an inevitable trend. It is a benign strategy to improve China's intellectual property law by drawing on the legislative experience of relevant intellectual property laws of developed countries in AI industry to address AI challenges. In order to analyze the convergence, accuracy and efficiency of the localization algorithm, this paper designs an experiment of hybrid localization of complex surfaces and planes, and verifies the reliability and practicability of the computer aided localization system through many experiments. The principle of interest balance in intellectual property law is analyzed and explored.

Keywords: Deep Learning; Computer Assistance; Digital Age; Intellectual Property Rights; Balance of Interests.

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1 INTRODUCTION

If the appearance of the computer is one of the greatest inventions of the human century, and it is a clear sign that human society has entered the information age, then the appearance of computer software (also called software) is a milestone for human society to achieve another substantial leap [1]. Entering the digital age, the main forms are more diverse, and collective creation

occupies the vast majority of digital products. At the same time, data has become an indispensable element to drive innovation. Its natural non-competitiveness and non-exclusiveness will break the inherent program and boundary of static distribution, and the value system of intellectual property law is facing reconstruction. With a new round of economic restructuring and technological innovation being carried out all over the world, the competition and contest among enterprises is becoming increasingly fierce, and the role of computer software technology in economic promotion and benefit acquisition is increasingly prominent. The quality of computer software technology greatly determines the speed and degree of development and progress of enterprises, and its importance naturally needs no repetition [2].

China's intellectual property research, legislation and judicial practice really started after the reform and opening up. The reason why China attaches importance to intellectual property work has something to do with the importance of intellectual property itself. Mr. Zheng Chengsi, the pioneer and founder of China's intellectual property, believes that without the protection of intellectual property in China, China will no longer have the glory of the four great inventions; His disciple Xu Jiali believed more directly that China's manufacturing system is complete and ahead of the world. Intellectual property rights are crucial in the process of protecting innovation and forming the system. Intellectual property rights should be the foundation of industrial countries [3]. And the software industry is the soul and core of the information industry, which is closely related to all aspects of the country's life and national security, and plays a driving and multiplying role in national economic development. Based on their own development status and technical level, all countries in the world are striving to develop the software industry and have formulated relevant development strategic plans [4]. Although in recent years, the academic circles have increasingly discussed the reform of intellectual property law and the balance of interest system, in general, the research field is still relatively single and fragmented, and there is a gap between intellectual property law and the practical needs that urgently need systematic elaboration because of the deep impact of the new scientific and technological revolution and industrial reform [5].

This paper summarizes the intellectual property protection under the assistance of computer, compares and analyzes various models of software intellectual property protection, summarizes the advantages and disadvantages of various models, and puts forward the path of software intellectual property protection in combination with the technical characteristics of the new technology era and the characteristics of software. Its purpose is to realize the harmonious development of artificial intelligence and intellectual property law, so as to promote the technological innovation and development of artificial intelligence industry. Its innovation lies in: (1) Make systematic analysis and research on various current positioning algorithms, and make comparative research on robustness, positioning accuracy and computational efficiency. On this basis, some conclusive suggestions are given on the setting of initialization parameters, the applicable scope of localization algorithm and the applicable occasions of different localization algorithms. (2) Combined with the characteristics of new technology and software, the advantages and limitations of traditional protection modes are summarized and analyzed, and compared. By drawing lessons from foreign software intellectual property systems and experiences, a software protection mode with patent protection as the main and trade secret protection as the auxiliary is obtained.

2 RELATED WORK

In the early 1980s, China began to propose to establish its own software industry. The software industry started late and its technology development was relatively backward. The domestic research on intellectual property is relatively late, and the theoretical research on software intellectual property protection has made some achievements, but there is still a gap between the laws and systems of software intellectual property protection and those of developed countries abroad. The discussion on software patent protection, trademark protection and trade secret protection has been ongoing. Whether software can become the object of patent protection, what

kind of model to adopt to protect software, and how to solve the practical problems of software patent protection have been the focus of domestic research.

At present, people's awareness of the property rights protection of computer software technology is relatively weak, which makes the relevant interests of digital property rights protection repeatedly violated. This violates the interests of developers. Li et al. [5] discusses the necessity of intellectual property protection and related protection methods from the perspective of computer software intellectual property protection. The rapid development of computer technology is inseparable from the common development of software technology and hardware technology. Among them, the continuous innovation and development of computer software is the key to the deepening of the information technology revolution. As a technology driven by innovation, intellectual property protection is an important driving force to ensure the continuous development of computer software technology. With the continuous development and growing popularity of the computer industry, Lin et al. [6] have a deeper understanding of computer software, which is not only an appendage of computer hardware. The common innovative and practical invention and design in various industries will be included in the scope of patent protection by various countries. The protection of digital property rights belongs to the practical application of mathematical problems in the computer field, so it is included in the category of patent protection. Both of them influence and promote each other and play an important role in improving the use and performance of computers. Nagai et al. [7] proposed a neural network analysis model under computer watermarking. This model can be used to build a watermark model based on neural network. The level of interest protection can be improved by encrypting the rights and interests. Onofrei and Ferry [8] has carried out an experiment. These digital engineering aided designs can help with the learning process. Achievements of various types that are competitive for the Company or the Group as specified in the law. When computer software is protected as a trade secret, software related documents and even unfinished programs are protected and protected by relevant laws. Reece and Robinson [9] describes a learning technique in the state of subcategory difference analysis. This technology is very effective in detectability and testing speed. Each computer software is usually a confidential labor product independently developed and produced by each company and limited to the independent use or sale of the company. Therefore, it can be protected by law as a trade secret. Yang et al. [10] proposed that the available expressions are limited and similar to existing software. The exclusivity of software copyright is relatively weak compared with that of other intellectual property rights.

3 METHODOLOGY

3.1 Structural Problems of Intellectual Property Interests Balance in Digital Age

The digital transformation of the scientific community inevitably brings subversive influence to the existing theories and systems of intellectual property law. However, in today's digital era, there are many new creations that are creative, interesting, rich in content, diverse in form, and instantly shared and disseminated. These creations may be copying, extracting, adding, improving, editing and other behaviors on the original works. As shown in Figure 1.

The purpose of copyright law is to encourage and balance the freedom of creation, expression and contact, and to give up some "compulsory enforcement" in the digital field, that is, to moderately expand the scope of rational use while keeping the exclusive rights of copyright from being derogated, which not only reflects the modest and compromising attitude toward, but also stimulates the innovation vitality of digital social and cultural knowledge. In other words, based on the basic principle of not squeezing the market space of copyright owners, the extension of fair use is allowed to be limited, and the creative freedom of people in digital culture is respected to the maximum extent.

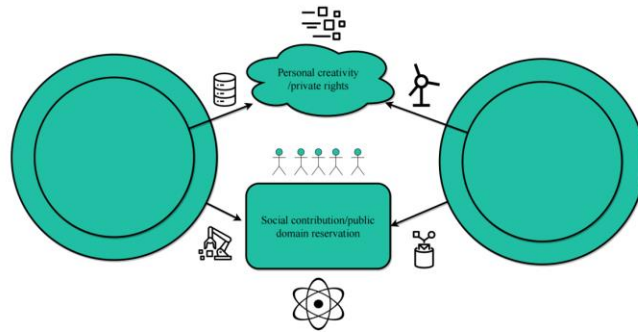


Figure 1: Center edge model.

3.2 Strategies of China's Intellectual Property Law to Meet the Challenge of Deep Learning

Artificial intelligence technology has been widely used in various fields of society, especially in the fields of commerce and manufacturing, which has comprehensively affected all aspects of society. At present, China's intellectual property law cannot ignore this. However, with the progress of technology and the deepening of people's understanding of software, people find that software can solve specific technical problems by running in a specific hardware environment. In the development stage, the programmer needs to first carry out system design, clarify the basic processing flow of the system, conceive the system organization structure, divide specific modules, achieve reasonable function allocation, and also carry out interface design, data structure design, error handling, etc. Then in the following detailed design, the main algorithm design, data structure implementation and various function calls in specific modules need to be carried out step by step. After that, the programmer will perform corresponding coding according to the requirements in the detailed design, embody these algorithms in the form of code, and finally form a complete program. As shown in Figure 2.

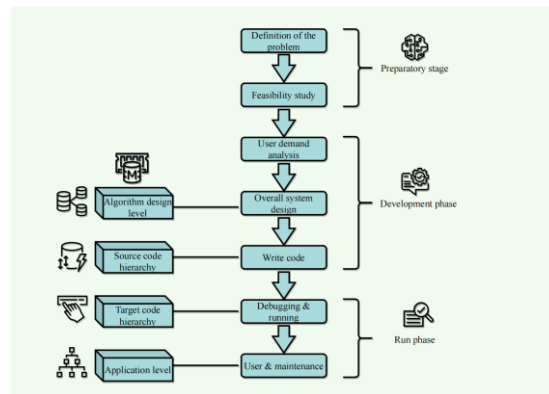


Figure 2: Computer Aided Function Development Process.

There will be more and more works of artificial intelligence generated independently. If the intellectual property law does not specify the ownership of these works, many legal disputes will arise. Take the motion of a plane as an example. Because of the symmetry of the plane, SE (3)

cannot be determined to uniquely represent the rigid body motion of the plane, that is, two different elements in $SE(3)$. If one of them can become the other through rotation around the plane normal vector or translation in the plane direction, then these two $SE(3)$ can represent the same plane.

The concept and related knowledge of $SE(3)$ have been mentioned in the analysis of rigid body motion in section. Suppose $G_0 \subset SE(3)$ is a subgroup of $SE(3)$, and its coset is defined as:

$$SE(3)/G_0 = \{gG_0 \mid g \in SE(3)\} \quad (1)$$

$$\mu: SE(3) \times SE(3)/G_0 \rightarrow SE(3)/G_0 \parallel (g, hG_0) \mapsto ghG_0 \quad (2)$$

Calculate the niche number of individuals

$$M_j = \sum_i^{N_k} Sha(d_{j-i}) \quad (3)$$

Where, N_k refers to the number of individuals in the non-inferior solution set k corresponding to the F_k dominance level.

Calculate the new fitness value of individual j .

$$f_{sha}^k(j) = \frac{f_d^k}{M_j} \quad (4)$$

Where $G_0 \subset SE(3)$ is a subgroup of $SE(3)$. A typical differential structure is defined on $SE(3)/G_0$: Let \mathfrak{g}_0 be a Lie algebra of G_0 , and choose a complementary space M_0 to satisfy it.

$$M_0 \oplus \mathfrak{g}_0 = so(3) \quad (5)$$

It is not difficult to see the following mapping relationships:

$$\psi: M_0 \oplus \mathfrak{g}_0 \rightarrow SE(3): (\hat{m}, \hat{h}) \mapsto \exp(\hat{m}) \exp(\hat{h}) \quad (6)$$

3.3 Dynamic Realization of Intellectual Property Rights Interest Balance in Digital Age

A significant change of the digital revolution is that physical space and time are combined with virtual space and time, which makes knowledge and information, content production, and social relations show a trend of centralization. People can complete collective creation on sharing websites at anytime and anywhere, and can also use algorithms to analyze massive heterogeneous data and dynamic data to draw innovative conclusions. Throughout the ideological origin of intellectual property, the concept of reward and distributive justice have become important values guiding the balance of intellectual property interests. Based on the concept of reward, it is legitimate and reasonable to endow individual intellectual property rights that contribute to creative achievements.

Usually, this integral function can't provide accurate analysis, or it takes exponential time to calculate. As a result, the real posterior distribution can't get the exact solution, which also explains why the posterior distribution of the current probability model is difficult to calculate, and the approximate algorithm is often needed to calculate it. Next, the average field theory is briefly introduced. The average field theory originated from statistical physics, which is a theoretical method. If it is mapped into the probability graph model, the complex interactive random variables

in the probability graph model can be transformed into independent and identically distributed random variables.

For example, suppose there is currently a joint probability distribution of n with $p(X)$ random variables:

$$p(X) = p(x_1, x_2, \dots, x_n) = p(x_1)p(x_2|x_1) \quad (7)$$

Based on the mean field theory, it can be obtained that a joint probability distribution $q(X)$:

$$q(X) = q(x_1, x_2, \dots, x_n) = q(x_1)q(x_2)...q(x_n) \quad (8)$$

In the variational reasoning, firstly, the variational distribution family of potential variables is assumed to be Q , each of which is $q(Z) \in Q$. The goal is to find a $q^*(Z)$, so that it can approximately replace the posterior distribution $p(Z|X)$ of potential variables. Therefore, the current reasoning problem is equivalent to the following optimization problem:

$$q^*(Z) = \arg \min_{q(Z) \in Q} KL(q(Z) \| p(Z|X)) \quad (9)$$

$$KL(q(Z) \| p(Z|X)) = \int q(Z) \log \frac{q(Z)}{p(Z|X)} dZ \quad (10)$$

The positioning of complex surfaces can still rely on the positioning algorithm mentioned earlier. Here, we will simply explain the NURBS modeling process.

A NURBS surface with u degrees of freedom in the direction of P and v degrees of freedom in the direction of Q is represented by the rational function of binary piecewise vector as follows:

$$S(u, v) = \frac{\sum_{i=0}^n \sum_{j=0}^m N_{i,p}(u) N_{j,q}(v) \omega_{i,j} P_{i,j}}{\sum_{i=0}^n \sum_{j=0}^m N_{i,p}(u) N_{i,p}(v) \omega_{i,j}} \quad (11)$$

The formula $P_{i,j}$ constitutes a two-dimensional control grid, $\omega_{i,j}$ is the weight of each control point, and $\{N_{i,p}(u)\}$ and $\{N_{i,q}(v)\}$ are the basic equations of irrational B-spline defined by the following nodes:

$$U = \left\{ \underbrace{0, \dots, 0}_{p+1}, u_{p+1}, \dots, u_{m-p-1}, \underbrace{1, \dots, 1}_{p+1} \right\} \quad (12)$$

Where $-j$ is for all items except the j . The final form of the above expectation will only contain the parameters of the variational distribution. In Formula 12, except for the constant term, the rest can be regarded as a negative KL divergence. To maximize the ELBO, the negative KL divergence must be 0, so we can get:

$$\log^*_{q-j}(z_j) \propto E_{q-j} \left[\log p(z_j | X, z_{-j}) \right] \quad (13)$$

It is further summarized that:

$$q^*_{q-j}(z_j) \propto \exp \left(E_{q-j} \left[\log p(z_j | X, Z_{-j}) \right] \right) \quad (14)$$

In this chapter, a patent valuation model based on Bayesian graph convolution neural network is proposed for the specific valuation object of t .

$$VMI = (Y^t, W^t | X^t, VO^*, VS^*, \Gamma^*, \Phi^*, M^*) \quad (15)$$

$$\gamma_{y^2}(y) = \tau^{-1} I \quad (16)$$

Among them, $\sigma(\cdot)$ represents the nonlinear activation function, $|N_t|$ represents the number of neurons in the l layer, and I represents the identity matrix, which is the inverse (reciprocal) of the contrast of a noise term.

4 RESULT ANALYSIS AND DISCUSSION

As for the design of special law, the first thing to pay attention to is to ensure that most of the intellectual property owners of computer software can be protected. Of course, some simple and extremely short-lived computer software (such as a few days or even hours) can be excluded from the scope of protection of special law, but the excessive setting of special law should be slightly lower, so that the computer software expected to be protected can be treated equally, and can be protected by special law conveniently and simply. A wide range of protected objects can make the special law universally applicable, form a standardized legal order, and allow more computer software intellectual property owners to share the benefits brought by special legislation. Another difficult problem in patent protection of software is the problem of three-character examination of software. Patents all over the world stipulate that certain conditions must be met to obtain patent rights. These conditions usually include formal conditions and substantive conditions. 1 The data set includes 1187 patent data of international patent classification (IPC) class II A61 and 232 annual report data of China listed company industry classification (IC)27. As shown in Table 1.

<i>Data set</i>	<i>Dataset 1</i>	<i>Dataset 2</i>
#IPC	A62	H03
Number of patents	4265	2268
#IC	21	22
Numb. of annual reports	200	265

Table 1: Description of experimental data.

Table 2 shows that the mean absolute error (MAE) and mean relative error (MRE) of VM1 are low for data set 1 with A61. This shows that VM1 is superior to the comparison model in the accuracy of data set 1(A61) (including MAE and MRE).

<i>Field</i>	<i>Measure</i>	<i>BNN</i>	<i>VMI</i>
Dataset 1	MAE	110.622	62.221
	MRE	1.2396	0.598
Dataset 2	MAE	88.23	32.259
	MRE	2.265	1.326

Table 2: Comparison of MAE and MRE between VMI and BNN.

The above results show that increasing the valuation scenarios can improve the accuracy of patent valuation, thus reducing the average absolute error (MAE) and average relative error (MRE). As shown in Figure 3.

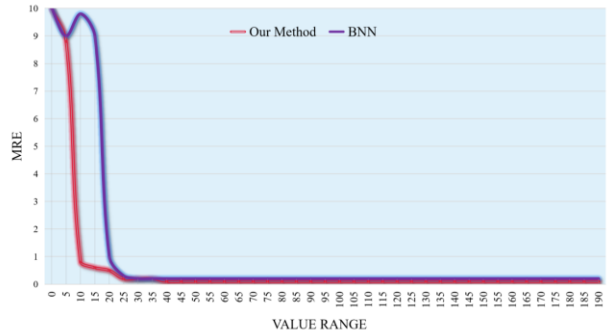


Figure 3: MRE of vm1 and BNN varies with the value in dataset 1 (A61).

Algorithms are often associated with mathematics or mathematical algorithms, and are often regarded as the category of rules and methods of intellectual activities. Based on this, patents will not be granted. This makes many "creative" factors in computer software unprotected. This is not conducive to the development of artificial intelligence industry. Therefore, the rules, methods or algorithms of artificial intelligence activities should be patentable or similar software copyrights granted. It is suggested that the future revision of China's intellectual property law should be more patent-oriented. Judge the deviation between the obtained Euclidean transformation matrix G_e and the initial G_a after the same number of iterations. As shown in Figure 4, Figure 5 and Figure 6.

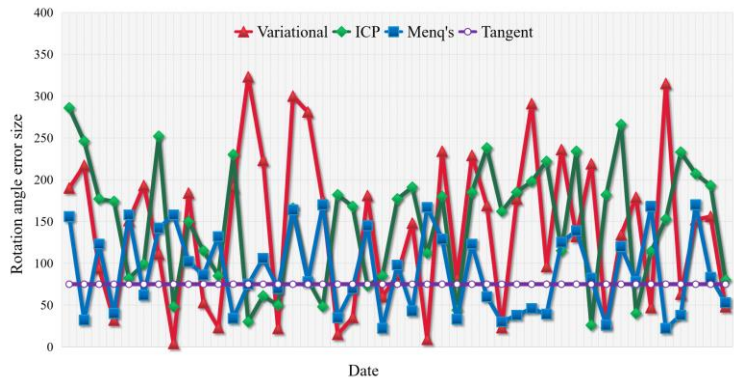


Figure 4: Relation between Iteration Times of Several Positioning Algorithms and Rotation Error.

Under the same initial conditions, use the Variational, ICP, Menq's, Tangent, Hong Tan positioning algorithms to simulate the NURBS surface of the six control points in Figure. The positioning algorithm experiment is the process of using the CAS system developed in Chapter 4 and applied to the TIMAX machine tool.

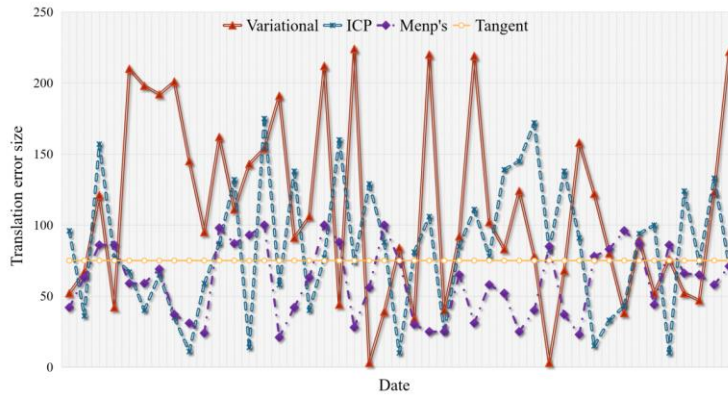


Figure 5: Relation between Iteration Times of Several Positioning Algorithms and Translation Error.

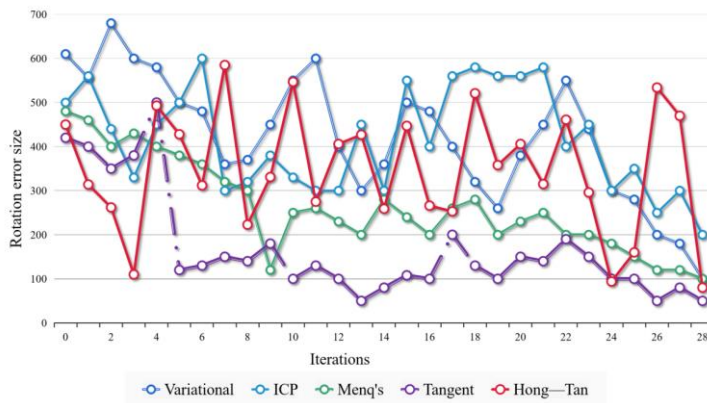


Figure 6: Relation between Iteration Times of Several Positioning Algorithms and Rotation Error.

Without losing generality, we set a workpiece to be fixed on the workbench at will, and two planes are used for positioning, one is the plane that has finished finishing, and the other is the blank surface with complex curved surface that has not been processed. This is a mixed inclusion positioning problem. As shown in Table 3.

Count	Tangent algorithm time	Hong Kong—TanAlgorithm time	Count	TangentAlgorithm time	Hong Kong—TanAlgorithm time
3	4.32	1.32	50	39.85	5.36
6	3.26	2.03	60	37.63	3.22
5	10.26	2.58	70	49.56	6.55
11	16.23	3.26	80	68.32	3.696
26	22.88	3.52	90	69.52	8.65
28	28.95	5.00	100	80.63	9.62

Table 3: Comparison of calculation efficiency between the two algorithms.

After the workpiece is fixed on the workbench, the measuring point system of CAS can be started. There are three methods of measuring points: manual, automatic uniform and optimization. In this experiment, the automatic uniform measuring point method is selected. After the edge of the workpiece is specified, the system starts to automatically run the measuring point system.

Correlation coefficient of each internal interval is calculated. Figure 7 shows the calculation results of each internal interval.

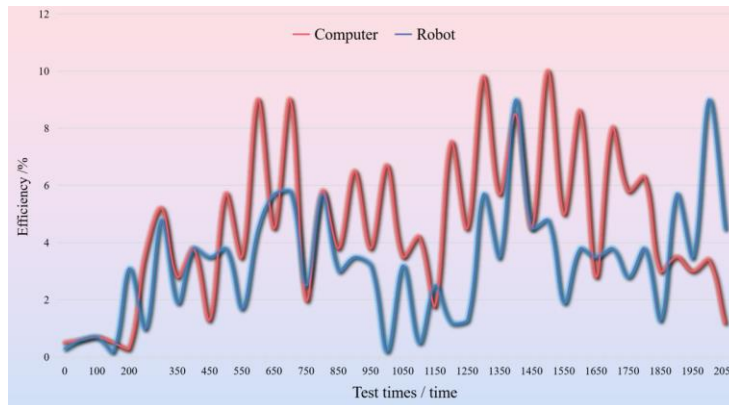


Figure 7: When evaluating high value patents, the correlation coefficient will increase.

Through this means, we can stimulate the creative and innovative power of knowledge creators. However, it is precisely because of the protection of intellectual property rights to the right holders that many intellectual property owners pay too much attention to the economic benefits brought by intellectual property rights, and are unwilling to easily disseminate their intellectual achievements to the society without bringing economic benefits, which is very unfavorable to the realization of the overall interests of society.

5 CONCLUSIONS

With the enabling application of the new generation of information technology such as 5G, the characteristics of decentralization and internet of everything accelerate the circulation of data, and great changes have taken place in the growth, dissemination and trading of knowledge, especially in the field of digital copyright. The features of search, click and read, download and copy are easy to cause large-scale infringement, and the uncontrollability of infringement and the substantial increase of execution cost will have a substantial impact on the balance of interests of intellectual property. Rights by patent law also seems inadequate. Various laws comprehensively protect the intellectual property rights of software, which is complicated and redundant, and inevitably falls into the dilemma of square cutting. In this paper, several important aspects of the computer aided positioning system are studied and discussed, including the mathematical model of workpiece positioning, theoretical analysis of positioning algorithms, the types of workpieces suitable for positioning algorithms, fast positioning of common geometric surfaces, and the selection of initial values of positioning algorithms. The robustness, accuracy and efficiency of the algorithm are simulated, and some characteristics of the algorithm are obtained; A comprehensive experiment of complex surface hybrid positioning and containment positioning is designed. Through several experiments, the reliability and practicability of the system are verified.

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