Hindawi
Advances in Multimedia
Volume 2022, Article ID 4609882, 10 pages
https://doi.org/10.1155/2022/4609882

Research Article

Design Method of Smart City Public Planning under the Constraint of Public Acceptability

Ben Pi and Pinghui Liu

East China University of Technology, Nanchang 330000, China

Correspondence should be addressed to Ben Pi; 2020120015@ecut.edu.cn

Received 7 April 2022; Accepted 11 May 2022; Published 29 June 2022

Academic Editor: Qiangyi Li

In order to improve the design effect of smart city public planning, this paper studies the design method of urban public planning under the constraint of public acceptability and designs the corresponding intelligent system. Moreover, from the perspective of the planning system and practical application, this paper is devoted to improve the performance of the planning system and expand the application field of planning technology. In addition, this paper analyzes and studies the preprocessing stage and the planning search stage of the planning system and applies its domain knowledge modeling to practical planning problems. The experimental research results show that intelligent public urban planning and design method proposed in this paper under the public acceptable constraints has a good effect.

1. Introduction

Urban public services refer to various public products and services provided by urban public service departments to citizens. It includes the construction, management, and maintenance of various urban infrastructures, the creation and provision of jobs for citizens, the construction of public utilities such as education, medical care, science and technology, health, sports, and culture, as well as the timely release of various public service information to the society and the creation of conditions to provide guarantees for citizens to participate in public service management, and so on. In a modern city, its public service framework system generally consists of four sections: municipal facilities construction services, comprehensive services for enterprise development, comprehensive services for residents' life, and services for scientific and cultural popularization.

At present, with the increasing attention to public emergencies such as urban vulnerable groups and urban public disasters, some scholars suggest that they be included in the scope of urban public services. Different cities have different industrial forms, residential structures, economic volumes, geographic locations, and spatial scales. The focus of its urban public services and the urban style and urban cultural connotation formed by public services are also different [1]. However, for any city, the above six items should be the basic content of the construction of the urban public service system, and also an indispensable and necessary content in its framework system. However, different cities can configure the development sequence of six basic service areas according to their own development status and future positioning [2]. For example, some cities have more universities and research institutes, and position themselves as regional or nationally influential technological and cultural centers. Then, in the construction and development of public services, resources and elements should be appropriately inclined to the popularization of science and culture services. It can be said that urban public services involve many fields and are closely related to the production, living, and learning activities of urban residents. Moreover, it is an important support for the all-round development of urban residents, and it is also the basic guarantee for the efficient operation and rapid development of urban economy and society [3].

At present, the development of intelligent technology is showing the characteristics of blowout, and the application of intelligent technology is also in the process of accelerating popularization. For example, mobile phones and computers, which are closely related to human life, are currently in the stage of intelligent application. The application of smartphones and their combination with the Internet are profoundly changing the traditional communication, consumption, and lifestyle of human beings. According to statistics, the penetration rate of smartphones is close to 70%. If personal computers are taken into account, the penetration rate of smart communication electronic devices may be even higher. Even if a person does not have the application ability of intelligent devices, he is inseparable from the application, recognition, and other intelligent functions of intelligent technology in today's social life. It can be said that intelligence has become an important feature of the new era. It is not only a way of production but also a way of life and a way of learning. For this reason, the development and application of intelligent technology have been highly valued and have become a national strategy, which is reflected in the long-term strategy and various specific plans for national economic and social development, as well as various industries related to it. Development and application of intelligent technology in the future will become a pillar of the national economy, which is related to the improvement of the country's comprehensive national strength and even the international status. It is also an important driving force to promote the development of industrialization and urbanization.

This paper studies the method of urban public planning and design under the constraint of public acceptability, designs the corresponding intelligent system, and improves the effect of urban public planning and design.

2. Related Work

The affairs involved in urban public services are complex, and an important goal of intelligent application is to integrate them into an efficient operation platform. At present, the application of intelligent technology and equipment in urban public services has become more common, such as the urban public transportation system, the power supply system, the water supply system, the financial service system, and the medical and health system. The use of intelligent equipment has greatly facilitated the life of citizens [4]. However, although the application of intelligence in various subsystems of urban public services is relatively common, there is still a large developmental need and integration space for the integration of various fields and the integrated platform of urban public services formed on this basis [5]. Urban public services should be integrated into a relatively independent and highly integrated operation platform in intelligent development. The docking and compatibility between various service fields are very important, and the development of big data and cloud computing technology has provided this. This integration provides technical support, and the key is to improve the awareness of coordinated development among the management of urban public services. If various fields of urban public services operate independently in intelligent development and lack coordination, then the construction of intelligent public service platforms will be impossible. It is also difficult to give full play to the efficiency improvement advantages of intelligence, thereby limiting the improvement of the city's core competitiveness [6]. At the same time, the intelligent development of urban public service platforms is based on the intelligent development of various fields. If the intelligent development of various fields is not synchronized or the intelligent development of various fields cannot reach the level of realizing subsystem integration, then it will also limit the integration and promotion of public services in intelligent cities and the development of platforms [7].

As the main supplier of urban public products and services, the urban public service platform is the basic content of the modernization of urban state governance capacity and governance system modernization, and one of its main responsibilities is to ensure the various public products required for the development of cities and residents, and service, and the key lies in the quality and efficiency of supply [8]. The main purpose of promoting the intelligent development of urban public service platforms is to provide citizens with high-quality public products and services, thereby optimizing the city's economic and social development environment [9]. In addition to serving citizens, the intelligent city public service platform also shoulders the responsibility of serving enterprises and other social groups that promote industrial upgrading and economic transformation [10]. The realization of the intelligent development of the urban public service platform itself and its target positioning is not only whether it is intelligent but also closely related to the supply system of urban public products and services [11]. At present, the urban public service system still retains many characteristics of the era of planned economy, mainly relying on the supply of state finance, and the main body of public goods and services are mostly state-owned enterprises or institutions, such as the urban public transportation system, medical and health system, science, education and culture system, and electric water supply system, [12]. This supply model not only has low supply efficiency but also restricts the participation of social capital in public goods and services [13]. In the case of relatively limited government financial resources, social capital is limited in the production and supply of public goods and services, making it difficult for the government to concentrate financial resources to promote the intelligent development and platform integration of urban public service platforms [14].

To a certain extent, the era of intelligence represents the latest scientific and technological achievements of the third scientific and technological revolution and its future development trend. The core competitiveness provides technical support [15]. The process of urbanization is accelerating, and the contradiction between the needs of urban public services and traditional public service production, supply, and service mechanisms has become more and more prominent. Specifically, the public service awareness is not strong, the official standard thinking in administrative management still exists, the supply of public services is insufficient, the efficiency is not high, and the platform integration is not obvious [16]. Faced with this situation, we can only make full use of the latest scientific and technological achievements represented by intelligent technology to continuously promote the integrated development and platform construction of urban public service platforms, and use big data, cloud computing and artificial intelligence technologies, and equipment to improve the supply of public services, quality and efficiency, and incorporate them into the reform of the urban public service management system [17]. In the era of intelligence, making full use of the achievements of intelligent science and technology to promote the construction of urban public service platforms is an inevitable need for the development of the civil society, an inevitable need for continuously optimizing the development environment of people in cities, and an inevitable need for promoting urban industrial cultivation and economic transformation. It is an inevitable need to promote the modernization of the city-state governance system and governance capacity [18]. Even in the current intelligent development of urban public services, there are still many restrictive factors. Under the background of the irreversible trend of the intelligent era, conditions should be actively created to promote the construction of urban intelligent public service platforms [19].

3. Solutions of Urban Planning Problems

The field of intelligent planning has developed for more than half a century. Relevant theories have proved that the existence of model solution and the problem of obtaining optimal solution are caused by PSPACE-complete. However, until now, planning systems are still not ideal for solving large-scale complex problems.

Since the satisfiable problem already has an effective solution algorithm and process, the planning solution of the original problem can be obtained quickly and efficiently. The specific steps are outlined as follows:

(1) The algorithm analyzes the description of the planning problem, and encodes its state representation, operation, and constraint relationship into propositional formulas. We assume that the original planning problem is a bounded planning problem $P = <P, O, I, G>$, the length of planning solution is limited to n, the 0th step of the planning corresponds to the initial state, and the nth step corresponds to the target state. Then, the proposition consists of the following five-part sets, where the symbol f_I represents a state predicate $(0 \leq i \leq n)$ in the ith step, I represents the initial state, and G represents the goal state.

The proposition of the initial state encoding is that the algorithm takes the conjunction of predicates that are true in the initial state, and the negation of predicates that are false in the initial state. By combining these state predicates again, the proposition encoded by the initial state can be obtained. This proposition can be expressed as

$$\Lambda_{f\in I} f \Lambda_{f\notin G^-} f. \tag{1}$$

The proposition of target state encoding is that the algorithm can obtain the desired proposition by taking the conjunction of all predicates in the target state that are true. Since this set of propositions must be true at the nth step, the set of propositions can be expressed as

$$\Lambda_{f\in G^+} f \Lambda_{f\notin G^-} f. \tag{2}$$

The proposition of action coding is that the algorithm can obtain the required proposition by taking the preconditions of action and the effect state of action, and combining them. For every $o \in O$ and every $0 < i \leq n$, the proposition can be expressed as

$$o_i => \left(\Lambda_{p\in \text{precond}(o)} Pi \Lambda \Lambda_{e\in \text{effect}(o)} e_{i+1}\right). \tag{3}$$

The explanatory frame axioms are: this set of axioms is based on the following logic that if the state predicate changes, then one of the actions that contains this state predicate in the action effect must be executed. For every predicate f and every $0 \leq i \leq n$, the fact can be expressed as

$$\begin{aligned}\left(f_i \Lambda f_{i+1} = >\left(V_{o\in O|f_i\in \text{effect}^+(o)|} O_i\right)\right) \\ = >\left(f_i \Lambda f_{i+1} = >\left(V_{o\in O|f_i\in \text{effect}^+(o)|} O_i\right)\right).\end{aligned} \tag{4}$$

The complete exclusion axiom is that the set of axioms guarantees that at each step of the planning process, one and only one action occurs. For every $0 \leq i \leq$ n-1, the proposition can be expressed as

$$(a_i \vee b_i) \Lambda (a_i \neq b_i). \tag{5}$$

(2) After the coding is successful, the SAT solving algorithm is used to judge the planning problem, and then judge whether the proposition can be satisfied. If it can be satisfied, a pair of assignments that can make the problem formula true are found, and the algorithm goes to step (3); if not, it means that there is no corresponding programming solution for this programming problem.

(3) According to the assignment obtained in step (2), the solution of the planning problem is analyzed.

The planning process of the SAT system is shown in Figure 1. The input of the compiler is the planning problem, which can be expressed by planning languages, such as STRIPS and PDDL, including initial state, target state, and action set.

The planning process is realized through the planning diagram, and the process can be divided into the following steps.

Simply put, the entire planning graph is a directed hierarchical graph, as shown in Figure 2. Among them, the black ellipse represents the proposition node, the rectangle

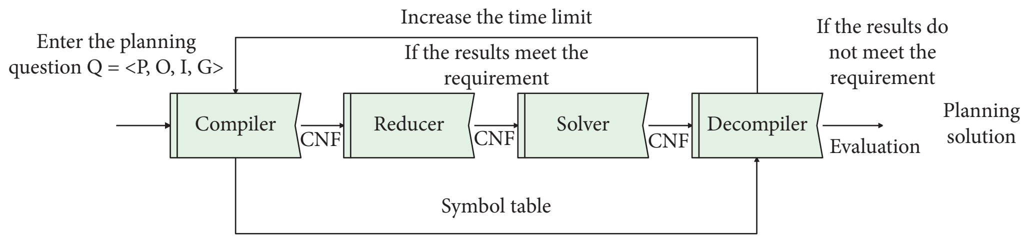

Figure 1: The planning process of the SAT system.

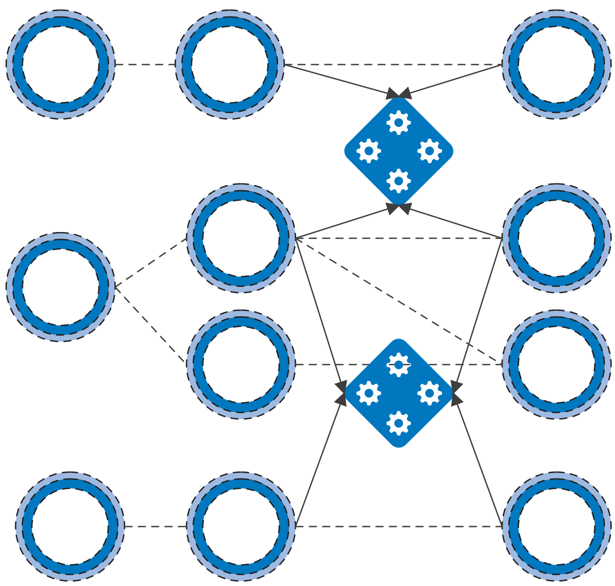

Figure 2: Planning diagram.

represents the action node, the solid line represents the association between the action and state proposition, and the dashed line represents the omitted node. The set of propositional nodes at level 0 in the figure represents the initial state I. After that, the planning graph will continue to expand forward, each time including a set of propositions and a set of actions. For the ith sublayer ($i > 0$), it corresponds to the action layer A and the propositional layer P, respectively, where A_i is the set of actions whose preconditions are nodes in P_i and P_i is the set of positive effects of actions in P_{i-1} and A_i.

Constructing a planning map is an iterative and in-depth process. In the forward expansion of each iteration, it is necessary to judge whether the target state set belongs to the current proposition layer and whether it conforms to the constraint that the target state set is not mutually exclusive. When these two conditions are met at the same time, it means that the planning graph has been generated. Because the planning diagram adopts the relaxed expansion diagram structure. It is a weak reachability analysis algorithm. The entire graph structure can be constructed in the time complexity of the polynomial size. In the worst case, a fixed-point layer P_n set $P_n = P_{n+i}\,(i > \,= 0)$ will be reached in the process of planning graph expansion. At this time, the planning graph reaches a steady state (level off). If the target state set is not yet included in the propositional layer, there is no planning solution, and the graph programming algorithm terminates.

Forced ordering is a very strict ordering. If there is a forced ordering between two subgoals, to complete the latter subgoal, the premise is that the previous subgoal has been completed or multiple subgoals can be planned at the same time, otherwise, there is no planning solution for this planning problem. That is to say, if there is a forced sorting relationship between the two, their implementation process has a strict sequence. The specific definitions are as follows.

Definition 1. For the planning problem $P = <P, O, I, G>$, $A \in G$, BE G and both A and B are atomic tasks. If and only if the following formula holds, there is a mandatory ordering relationship $V \leq_f A$ between A and B.

$$\forall S(A,B):\ \exists P^{O}:\ B \in \gamma\big(S(A,B), P^{O}\big). \qquad (6)$$

Among them, the action set obtained by planning the path is denoted as P^{O}. If Definition 1 is satisfied, then for any planned path to realize subgoals A and B, goal B must be completed before goal A is realized, or A and B must be completed at the same time, otherwise, deadlock will be encountered and the plan cannot be completed.

Definition 2. For the planning problem $P = <P, O, 1, G>$, $A \in G$, $B \in G$ and both A and B are atomic tasks. If and only if the following formula holds, there is a reasonable ordering relationship $B \leq_f A$ between A and B.

$$\forall S(A,B):\ \exists P^{O_A}:\ B \in \gamma\big(S(A,B), P^{O_A}\big). \qquad (7)$$

Among them, O_A represents the action set that does not have a negative effect on the target A, that is, $O_A = \{o \in O \mid A \notin \mathrm{del}(o)\}$. Definition 2 shows that if goal A has been achieved, any planning sequence that needs to achieve goal B will lead to the destruction of goal A, then the sequence of goal B is prior to goal A, and a reasonable planning sequence should be to implement goal A after goal B is completed.

Definition 3. For the planning problem $P = <P, O, I, G>$, $u \in G$, $v \in G$ and both u and v are atomic tasks. If and only if the following two conditions are satisfied at the same time, there is a reasonable ordering relationship $u \leq_{AO} v$ between u and v.

(1) $S_{[u,A]} \neq \varnothing \wedge \forall s \in S_{[u,A]}, P_{s->[v]} \neq \varnothing$,

(2) $\forall s \in S_{[u,v]}, \forall p \in \mathrm{OPT}_{s->[v]}, \exists a \in A(p), u \in \mathrm{del}(a)$

Among them, $S_{[u,v]} = \{slu \in s \wedge v \notin S\}$, s is the reachable state from the initial state I. $S[u, -q]$ represents the reachable state set $P_{s->[v]} = \left\{plv \in \gamma(s,p), s \in S_{[u,v]}\right\}$ that includes the goal state u but does not contain the goal state v, the action set $\mathrm{OPT}_{s->[v]} = \left\{P/p \in P_{s->[v]}\right\}$ from the state s that has achieved the goal A to the goal v, and the of optimal solutions from state s to achieving goal v. $A(p)$ represents the set of action sequences for the planned path p.

The maximum cost heuristic is based on "ignoring the negative effects of actions." Through the simplification of action, the number of propositions of the state can be decreased, and the calculation amount of obtaining the heuristic information value can be reduced. h_{add} and $h_{\max}$ represent the sum and the maximum cost heuristic function, respectively. Among them, h_{add} adopts the cumulative method to take the sum of the cost of each proposition from the current state to the target state as an indicator for evaluating the pros and cons of the action, and $h_{\max}$ adopts the method of taking the maximum value of each proposition cost from the current state to the target state as an index for evaluating the pros and cons of action.

The specific forms of h_{add} and $h_{\max}$ are given below. First, the state information of a single proposition is considered for the planning problem $P = <P, O, I, G>$, S represents the state proposition of the planning process, and $h_s(g)$ represents the evaluation cost of starting from the target subproposition g to the current state-state proposition s, where each subproposition $s \in S$. $h_s(g)$ is calculated as follows:

$$h_s(g) = \min\{h_s(g), 1 + h_s(\mathrm{Prec}(a))\}. \tag{8}$$

All actions $a \in O(g)$ are iteratively updated, and Prec(a) represents the precondition of action α. For any $g \in I, h_s(g) = 0$. If there is no $a \in O(g)$, that is, there is no action that can achieve g, then the cost of $h_s(g)$ is ∞. The calculation method of the h_{add} heuristic function value is as follows:

$$h_{\mathrm{add}} = \Sigma_{g \in G} h_s(g). \tag{9}$$

The calculation of the value of the $h_{\max}$ heuristic function is very similar to that of $h_{a\ dd}$, except that it considers the maximum value of the state information of all individual propositions. The calculation method of the $h_{\max}$ heuristic function value is as follows:

$$h_{\max} = \max_{g \in G}\{h_s(g)\}. \tag{10}$$

In the process of calculating h_{add}, in addition to ignoring the negative effects of the action set, it is also assumed that propositions are independent of each other and do not affect each other. However, in the actual planning process, there may be a positive effect between the realization of the proposition of the target state, which will lead to the h_{add} cost estimate being higher than the cost value of the actual realization of the target set, which is not acceptable. $h_{\max}$ solves the problem of h_{add}, and its value must be less than the cost of completing the planning of the entire target set, which is acceptable. The disadvantage of $h_{\max}$ is that it only considers the proposition with the greatest cost value, while ignoring the information of other propositions, which will affect the quality of the planning solution.

The specific definitions of domain transition graph and causal graph are as follows.

Definition 4. For any state variable vEv, the domain transition graph DTG (v) is a directed graph, and the vertices are the values of the variable v. There is a directed arc between two vertices m and n, and there is an action <pre, eff>, if and only if the following conditions are satisfied:

(1) $\mathrm{pre}(v) = m = m$ or $\mathrm{pre}(v)$ is not yet defined

(2) $\mathrm{eff}(v = n)$

That is to say, when the variable value m can be converted to n after applying the action $a \in O$, there is a directed radian between the two nodes.

Taking the TPP field as an example, if the location of the initial state of the truck car is $\mathrm{pos} = pl$, it can move to the markets m, m2, and ms. The constraints are that markets do not communicate with each other, and they can only be entered through pl.

The causal graph is also composed of a directed graph, and the difference is that the vertices of the causal graph involve the entire state variable. When the assignment transition to a vertex appears on the domain transition graph, the vertex on the causal graph also has a corresponding directed arc. The planned action execution can be simulated through domain transition graphs and cause-and-effect graphs.

The causal graph heuristic h_{CG} is to add up all the variable transition values involved in the current state set to the target state set and use it as the total cost estimate. The specific calculation method is as follows:

$$h_{CG} = \Sigma_{v \in \mathrm{dom}(G)} \mathrm{cost}(S(v), G(v)). \tag{11}$$

In the formula, dom(G) represents the state variable involved in the target state G, $S(v)$ represents the value of the variable v in the current state S, and $G(v)$ represents the value of the variable v in the target state. The computation of cost $(S(w), G(v))$ is achieved through the domain transition graph and the causal graph. The cost problem from $S(v)$ to $G(v)$ is essentially the shortest path problem of two nodes on the domain transition graph DTG(v). By default, two directly connected vertices have a cost of 1. When there is a path $\langle d_1, d_2, \ldots, d_n\rangle$ such that $S(v)$ is converted to $G()$, then cost $(S(w), G(v)) = n$.

Landmark, translated as "road sign," refers to proposition that must be realized during the planning process. There are often multiple landmark propositions on each planning problem, and there is an order relationship between them, which can be used to guide the planning process in the search process. Landmark counting heuristic is denoted as h_{Lmc}, and the number of landmark propositions that need to be completed to reach the target state through the current state S is used as the cost estimate. The specific calculation method of h_{Lmc} is as follows:

$$h_{\mathrm{Lmc}} = n \cdot m + k. \tag{12}$$

In the formula, n represents the total number of landmark propositions that need to be realized for this planning

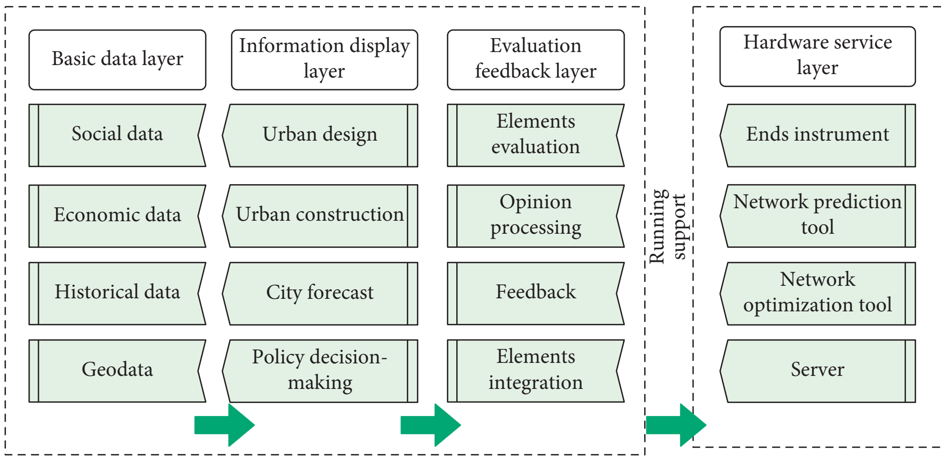

Figure 3: Intelligent platform development model.

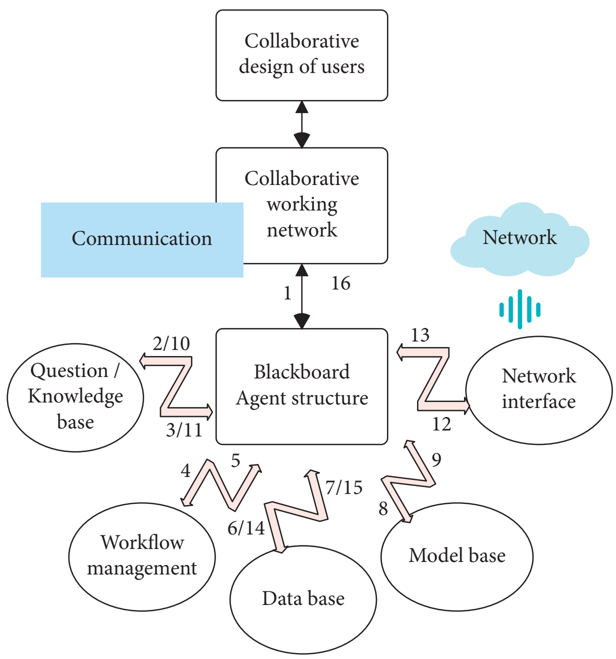

Figure 4: Knowledge model of collaborative design process processing.

problem, m represents the number of landmark propositions that have been completed, and k represents the number of landmark propositions that have been completed in the current state S but need to be realized again. The specific calculation method of h_{Lmc} is as follows:

$$h_{\mathrm{Lmc}} = \left(\frac{L}{\mathrm{Accepted}\,(S,\pi)}\right) \cup \mathrm{RequestAgain}\,(S,\pi). \tag{13}$$

Among them, L is the landmark set obtained before the search algorithm, x represents the action sequence from the initial state to the current state S, Accepted (S, x) represents the landmark set realized after the sequence x, and RequestAgain (S, n) represents the set of landmarks that need to be implemented for the current state S to reach the destination state. The calculation of Accepted (S, z) also involves the roadmap LG<L, O>. Among them, O represents all sorted sets in the form of $o \longrightarrow rt$, and the roadmap records the realization order of each landmark proposition and the set of propositions that need to be realized multiple times. $\mathrm{Accepted}\,(S,\pi)$ is calculated as follows:

$$\mathrm{Accepted}\,(S,\pi) = \begin{cases} \{\psi \in L|S| = \psi \wedge (\varphi \longrightarrow \psi) \in 0\}\pi = <>, \\ \mathrm{Accepted}\,(S_0, [\pi'], \pi') \cup \{\psi \in L|S| = \psi \wedge \forall (\varphi \longrightarrow \psi) \in 0\}, \\ \varphi \in \mathrm{Accepted}\,(S_0, [\pi'], \pi'), \pi = \pi'; <o>. \end{cases} \tag{14}$$

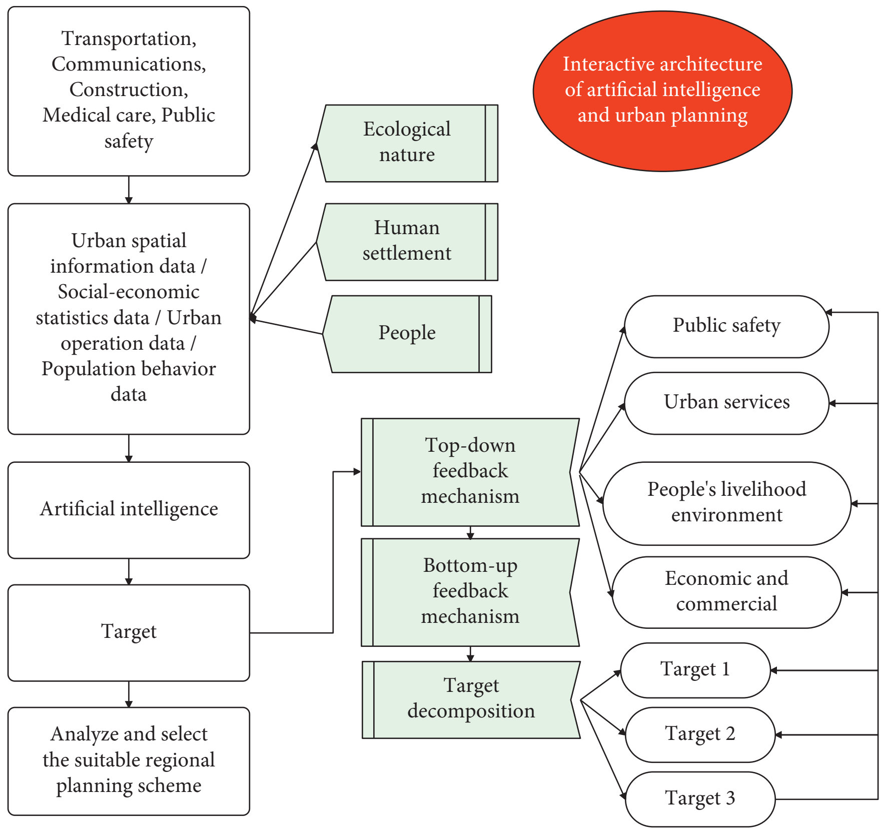

Figure 5: Complementary architecture of artificial intelligence and urban planning.

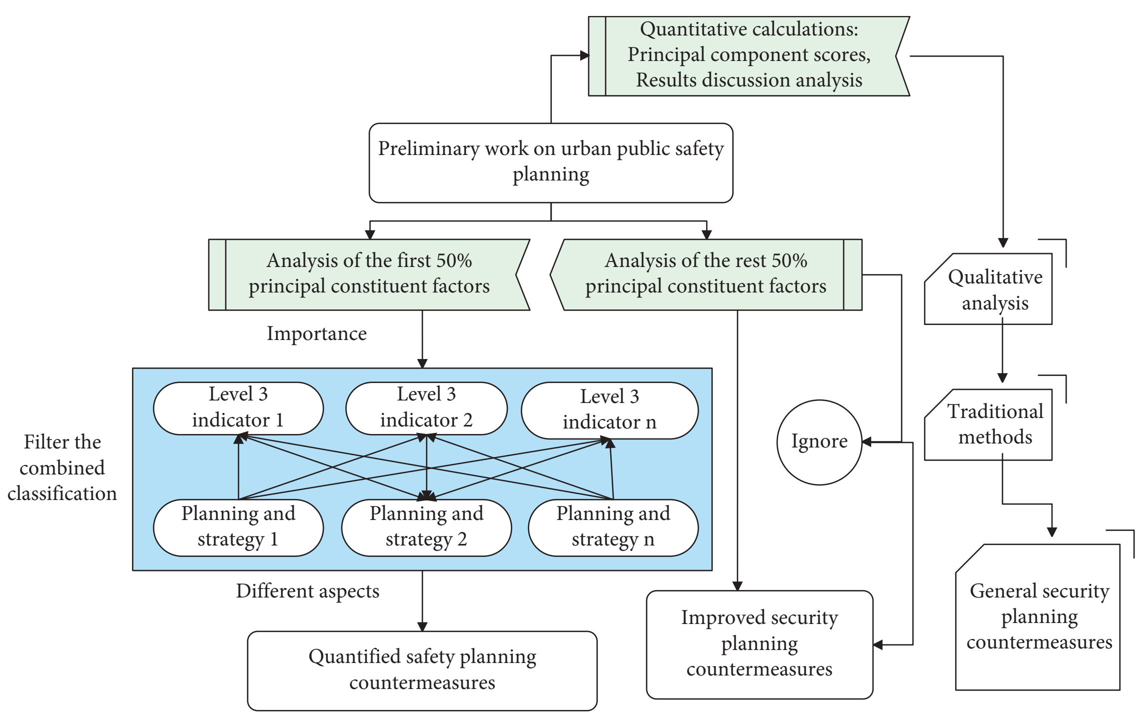

Figure 6: Smart city public safety planning.

Table 1: Feasibility analysis of design methods of smart public urban planning under public acceptability constraints.

Number	Feasibility	Number	Feasibility	Number	Feasibility
1	84.43	18	90.83	35	84.47
2	91.43	19	88.72	36	90.48
3	90.36	20	87.51	37	88.19
4	85.15	21	84.37	38	90.68
5	90.94	22	91.77	39	86.35
6	84.53	23	87.38	40	85.07
7	90.11	24	87.96	41	84.94
8	87.45	25	86.23	42	86.03
9	88.83	26	85.02	43	89.02
10	90.75	27	91.20	44	88.56
11	86.27	28	89.43	45	88.10
12	88.48	29	91.38	46	86.95
13	86.50	30	85.23	47	87.94
14	90.81	31	91.16	48	89.42
15	87.32	32	88.29	49	88.28
16	89.46	33	85.04	50	88.08
17	89.32	34	91.48	51	84.72

Table 2: Planning effect verification of the design method of intelligent public urban planning under public acceptable constraints.

Number	Planning effect	Number	Planning effect	Number	Planning effect
1	77.13	18	76.45	35	79.91
2	78.59	19	79.67	36	73.51
3	81.28	20	84.77	37	73.85
4	71.26	21	81.72	38	83.19
5	79.40	22	69.30	39	84.49
6	73.33	23	78.51	40	76.97
7	72.55	24	75.96	41	83.96
8	69.91	25	76.41	42	70.47
9	74.47	26	78.26	43	75.44
10	85.49	27	71.28	44	76.96
11	85.02	28	73.57	45	85.22
12	69.98	29	84.89	46	76.22
13	71.40	30	84.43	47	80.83
14	75.05	31	75.49	48	78.68
15	71.17	32	77.53	49	77.36
16	81.32	33	84.88	50	79.69
17	71.34	34	83.50	51	73.70

In the formula, ψ and ϕ are two landmark propositions and $\varphi \longrightarrow \psi$ represents the order relation of landmarks. The constraint condition φ that the landmark proposition φ is realized in the current state S is that it is a true proposition on S, and it is guaranteed that all landmark propositions that are sorted before φ in the landmark graph LG have been realized.

The set of RequestAgain (S, π) is obtained by Accepted (S, zr), and the single-element proposition p in it refers to the fact that the current state S does not hold, and y is a subproposition of the target state, or that p needs to support other unrealized landmark propositions on the adjacent steps. The specific calculation method of RequestAgain (S, π) is as follows:

$$\text{Request Again}(S, \pi) = \{\varphi \in \text{Accepted}(S, \pi) | S \notin \varphi \wedge (S_0| = \varphi \vee \exists (\varphi \longrightarrow \psi) \in O\colon \psi \notin \text{Accepted}(S, \pi))\}. \tag{15}$$

In each node search process, the landmark count heuristic value h_{Lmc} is obtained by calculating RequestAgain (S, π) and RequestAgain (S, π), and this evaluation value is used as reference information for exploring the next node.

4. Design Method of Smart City Public Planning under the Constraint of Public Acceptability

This paper constructs a design method of smart city public planning under the constraint of public acceptability to update the data in real time through the intercommunication between data. What is more important is the synergy and interaction between functions and data, which gathers information from other industries to support planning research and policy formulation. Moreover, it performs superimposed analysis and processing of data to achieve the functions of analysis, simulation, evaluation, and prediction. In addition, it superimposes various industry data to gradually transform the original static planning into dynamic, as shown in Figure 3.

In the collaborative design environment, application data/module/domain knowledge and control and monitoring information are distributed on each solution node of the system. At the same time, each distributed node cannot have enough data and knowledge to solve the whole problem. Therefore, it is necessary to exchange some data/knowledge/problem solving status and other information between each node and support the cooperative work through the computer to complete the cooperative solution of complex problems. The collaborative solving process of distributed problems is mainly divided into four steps: task description/task decomposition and distribution/cooperative solving of each subtask and solution synthesis. Around the distributed problem-solving process, this paper proposes a knowledge-based collaborative design process processing model (Figure 4).

According to the advantages of artificial intelligence in one-dimensional goals and real-time feedback mechanisms, and the advantages of modern planning in central planning and experience accumulation, it follows three planning principles: ecological nature, living environment, and people. Furthermore, this paper constructs a complementary system framework for artificial intelligence and urban planning (Figure 5). By promoting the application of artificial intelligence in the whole process of planning research, compilation, and management, it can sense, analyze, and integrate various key data information of the core system of

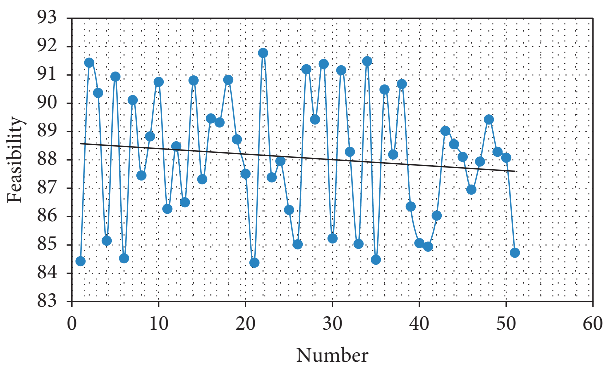

Figure 7: Statistical diagram of planning feasibility.

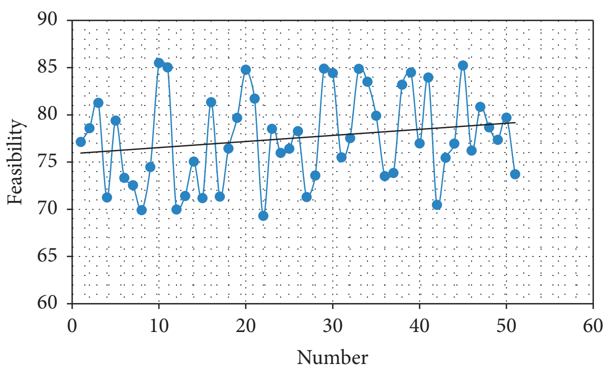

Figure 8: Statistical diagram of planning effect evaluation.

urban operation. In addition, through the continuous combination of urban planning experience and artificial intelligence learning, the complementary relationship between artificial intelligence and urban planning can be fully realized, and better planning decisions can be formed.

In urban public safety planning, a principal component may explain indicators of different natures, and it is difficult to carry out unified safety planning for them. Therefore, the indicators explained by the first N principal component factors can be scrambled and reorganized, and those with the same nature can be classified into one category for unified security planning. This can enhance the operability and enforceability of small-town safety planning, as shown in Figure 6.

After constructing the above model, the feasibility and planning effect of urban public planning in this paper are evaluated through simulation experiments, and the results shown in Tables 1 and 2, Figures 7 and 8 are obtained.

It can be seen from the above chart that the design method of intelligent public urban planning under public acceptable constraints proposed in this paper has a good effect.

5. Conclusion

Intelligence refers to the attributes of things that can actively meet various needs of people with the support of networking, big data, artificial intelligence, and other technologies. Moreover, intelligence is the basic feature and development trend of today's era, and is the product of the combination of data network technology and intelligent materials, and has a wide and profound impact on social and economic life. The era of intelligence is mainly reflected in the wide application of various intelligent equipment, equipment and facilities in the fields of social and economic activities such as production, living and learning, and the characteristics of the times it reflects. This paper studies the design method of urban public planning under the constraint of public acceptability and designs the corresponding intelligent system. The experimental research results show that the design method of intelligent public urban planning under the public acceptable constraints proposed in this paper has a good effect.

Data Availability

The dataset used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

This study was sponsored by the East China University of Technology.

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