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Design of the Smart City Planning System based on the Internet of Things

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Abstract

When the building boom of smart city set off all over the world, in order to seize the commanding heights of the construction of smart city, many of the cities in our country have introduced a variety of measures to build smart city planning. Presently, the construction of the smart city in China has stepped into the fast lane and is becoming a nationwide boom. Meanwhile, with the continuous progress of urbanization in China, the number of car ownership has been rapidly increasing and traffic congestion has become a frequent occurrence. In consideration of the nonlinear and time-varying characteristics of traffic, it is difficult for traditional traffic congestion evacuation strategies to cope with the complex changes of the traffic flow due to their poor adaptability. In addition, traditional evacuation assignment strategies are seldom made from the perspective of traffic flow relevance, which results in low efficiency on traffic congestion evacuation. However, during the construction of smart city, the wide application of technologies related to Internet of Things in various fields of smart city, which makes it possible to realize the instantaneity of information perception and technique collection, and helps to improve the sensory ability of the system. Based on this, and under the background of smart city, this paper puts forward a multi-agent-based concept of "model prediction, dynamic calculations, online feedback, beforehand evacuation" and researches on the evacuation strategies of urban traffic congestion.

Keywords: *smart city; Internet of Things; traffic flow; model prediction; beforehand evacuation*

1. Introduction

However, as an important part of smart city, intelligent transportation refers to the integration of sensor technology, communications technology, computer technology, cloud technology and automatic control technology and other advanced technology into each node of the transportation system, and forms an intelligent traffic pattern with an efficient management and control of transport facilities. The important symbol of smart city is the combination of the intelligent sensor technology, information network technology, communications transmission technology and data processing technology, which is represented by the Internet of things and cloud computing. In this network, achieve a comprehensive traffic information processing by the elements communicate with each other, and give the information elements to each of these elements, and combine the driving, drivers, travelers, roads and related services with each other. And then make the entire transport system achieve the function of intelligent. This article takes

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the event of easing traffic congestion as background, and combine with the technology of Internet of Things to research the intelligent transport planning deeply.

Internet of Things is a new technology application mode and accesses rapidly to remote information via modern wireless communication technology. Internet of Things (IOT) refers to a kind of “internet in which things are connected with each other”. That is, it achieves and perceives information by loading frequency identification and other information sensing devices onto articles. Then it connects with the ubiquitous Internet and forms the intelligent identification network in which ubiquitous information can be achieved and transmitted. In the technology of Internet of Things, floating car information collection technology is a kind of dynamic traffic information detection technology rising this year. The basic principle of this technique is to use vehicle information collection device to periodically transmit the data of vehicle ID, time, speed, latitude and longitude coordinates and then analyzes road traffic conditions through these data. With the gradual development of intelligent transportation systems, the traffic data collection devices in urban traffic network in our country are also constantly being improved, which makes it possible to realize the real-time ubiquitous collection of traffic flow state. The rapid development of modern detection techniques can provide accurate and timely data collection support for traffic system dynamic analysis.

2. The Real-Time Acquisition of Traffic Data and the Building of Traffic Flow Predictive Model

2.1. The Real-Time Acquisition of Traffic Data

Identity system is the key foundation of Internet of Things. In the system of Internet of Things where “things are connected with each other”, each transport element can get its unique identification code through the identity system and makes it easier for them to be perceived and addressed. The application of the Internet of Things technology can provide a globally unique identification code for such transport elements as traffic objects, means of transportation and transport infrastructure. Then the technology collects their identification code information and imports the information into identity authentication system so that all the elements of urban traffic network can be abstracted into a part of the identity authentication system. The real-time speed of vehicle can be detected by radar sensor devices and the real-time traffic flow of vehicle can be detected by magnetic, RFID, GPS devices [1].

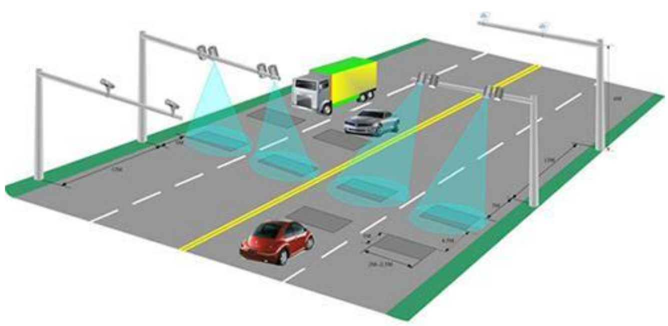

Figure 1. The Install Effect Diagram of High Definition Road Traffic Policing Bayonet

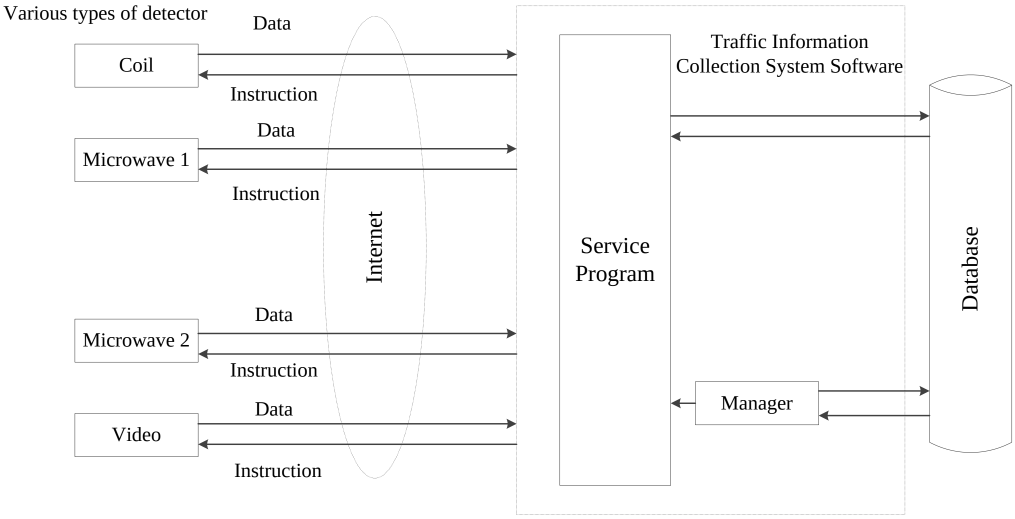

Figure 2. The Overall Design Diagram of the Traffic Information Collection System

Data input and output interface standards refer to that data input standards and storage standards of each traffic information system should be formulated so as to build a unified standard background data centers; they also develop data transmission standards for each traffic information system and regulate the traffic element information output interface formats of each subsystem, which lays a foundation for traffic element information collection and processing and which provides conditions for the construction of transportation integrated information processing platform based on Internet of Things [2].

2.2. Traffic Data Preprocessing

Data preprocessing involves two steps. One of which is parameter estimation. Such a step adopts corresponding estimate processing methods according to the different characteristics of the acquisition devices and transmits the discrete traffic data collected at different times and positions into the parameter of traffic state [3]. The other step is to screen errors and deficiency existing in data collection and transmission and to adopt reasonable and efficient methods to reconstruct the data. The final central database can be used for traffic simulation, prediction and traffic flow management, etc. Parameter estimation is closely related to the features of acquisition devices.

2.3. The Construction of Traffic Flow Predication Model

Urban road is a forward neuron, which refers to that neurons receive inputs from the previous stage and transmit them to the next layer, but without feedback. In the urban road network, the conversion of traffic flow at each crossroad contains behavior intervention from a large number of agents, which constitutes a complex system of hardware and software characterized by autonomy, sociality, reactivity, initiative, etc. The conversion of traffic flow at each crossroad is essentially an agent, and the entire urban road network is a multi-agent intelligent system [4]. According to the aforementioned traffic flow forecast functions of single road, the rules of traffic flow conversion at crossroads are manifested in the form of a matrix.

Supposed there is a crossroad and each of its lanes is a two-way street, then it is actually formed by four inflows and four outflows. Its evolution matrix can be represented as:

$$A=\begin{bmatrix}\alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14}\\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24}\\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34}\\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44}\end{bmatrix} \quad (1)$$

In this matrix, a_{ij} represents the evacuation weight from road segment j to road segment i, it should also meet the requirement of $\sum_{j=1}^{N} a_{ij}=1$. N represents the in-lane road segment number of all i road segments. According to these data, the traffic flow data of the crossroad can be achieved by using relevant technologies of Internet of Things. Supposed $q_i(0<i<N)$ is the traffic flow value of road segment i and $Q_{N\times 1}$ is the traffic flow data vector of the crossroad; supposed $q_i(0<i<N)$ is the predicated traffic flow value and $Q_{N\times 1}$ is the predicted traffic flow data vector of the crossroad. Then there is:

$$\begin{bmatrix} q_1^{'} & q_2^{'} & q_3^{'} & q_4^{'} \end{bmatrix}=\begin{bmatrix}\alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14}\\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24}\\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34}\\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44}\end{bmatrix}\bullet\begin{bmatrix} q_1\\ q_2\\ q_3\\ q_4\end{bmatrix} \quad (2)$$

Simplified representation is:

$$Q_{1\times N}^{'}=A\bullet Q_{N\times 1} \quad (3)$$

For each crossroad which is an agent, both its traffic outflow state and traffic inflow state can be represented by traffic flow vector. The evolution rules can be manifested by evolution dynamic matrix. The outflows of each crossroad are the inflows of their adjacent crossroads. Each road segment has an inflows weight and outflows weight.

The formula of discrete flow conservation in the road network should be:

$$q_i(t+1)=q_i(t)+y_i(t)-y_{i+1} \quad (4)$$

According to model needs, y_i, Q_i, n_i should be superscripted in order to differentiate variables from other road segments. For example, $y_i^a(t), y_i^b(t)$ represents the inflows of the *i*th of *a* road segment and *b* road segment at *b* time interval.

Data collected from pavement cables and floating cars include traffic flows of each traffic lane and the average speed of cars. According to the data, one crossroad in the road network is taken as a study example. The data needed to get include traffic inflow vector, $Q^{'}=\begin{bmatrix} q_a^{'}, & q_b^{'}, & q_c^{'}, & q_d^{'}\end{bmatrix}^T$, traffic outflow vector, $Q^{'}=\begin{bmatrix} q_a^{'}, & q_b^{'}, & q_c^{'}, & q_d^{'}\end{bmatrix}^T$, and dynamic weight matrix:

$$A=\begin{bmatrix}\alpha_{aa} & \alpha_{ba} & \alpha_{ca} & \alpha_{da}\\ \alpha_{ab} & \alpha_{bb} & \alpha_{cb} & \alpha_{db}\\ \alpha_{ac} & \alpha_{bc} & \alpha_{cc} & \alpha_{dc}\\ \alpha_{dd} & \alpha_{bd} & \alpha_{cd} & \alpha_{dd}\end{bmatrix} \quad (5)$$

In vector A, according to the traffic flow conservation law, all the column vectors sum to 1. Error weight vector is $B=\begin{bmatrix} q_{aa} & q_{bb} & q_{cc} & q_{dd}\end{bmatrix}^T$. This error is caused by traffic inflows and outflows in urban lanes, and it is processed as error terms here because of its irregularity.

The introduction of control methods is equivalent to a control weight matrix revision on the original dynamic vectors. Supposed the control weight matrix is:

$$K = \begin{bmatrix} k_{aa} & k_{ba} & k_{ca} & k_{da} \\ k_{ab} & k_{bb} & k_{cb} & k_{db} \\ k_{ac} & k_{bc} & k_{cc} & k_{dc} \\ k_{ad} & k_{bd} & k_{cd} & k_{dd} \end{bmatrix} \quad (6)$$

In order to guarantee the conservation of traffic flow, all the column vectors sum to 0.

According to analysis above, the dynamic matrix prediction model of traffic flow in urban road network can be represented as $Q^{'} = R \bullet Q + B$ and $R = A + K$.

The construction of traffic flow prediction model of one crossroad in urban road network is studied above, and the prediction model of other crossroads in the road network can be constructed in the same way [5].

3. Beforehand Evacuation Decision-Making of Urban Traffic Network based on the Technology of Internet of Things

Urban road network is filled with a large number of complex interactions of Individuals and has the characteristic of dynamic uncertainty, which constitutes the basis of the evolution of drivers' path selection. In this section, drivers are considered to be a homogeneous group. Through analyzing the interaction of drivers' policy choices, studying traffic guidance information at the traffic network level, researching drivers' path selection behavior (follow-induced or not follow-induced) and its evolution process, this section discusses how to develop effective induced strategies to make scientific assignment on network traffic flow, which makes driver path selection system move towards the desired way expected by managers.

Supposed that traffic induced system has developed to a certain scale. Drivers' each trip will produce a certain cost and the revenue of drivers can be seen as negative cost. Considering the simple path selection behavior shown in Figure 3, the two drivers 1 and 2 start from A at the same time and travel to the destination B. There are two paths can be chosen from. After receiving the induced information released by the system in A, the driver begins to make policy decision. He can choose to follow the induction or vice versa [6].

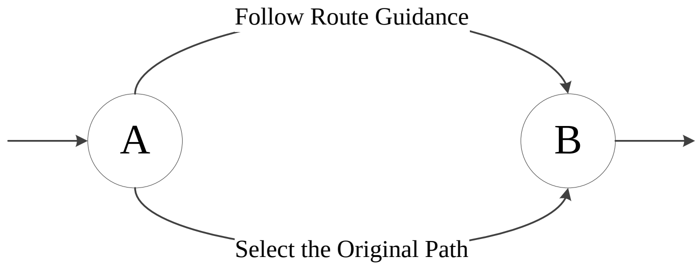

Figure 3. Drivers' Route Selection Diagram

Studies have shown that the travel cost of drivers is an increasing function of traffic flow. That is, the more the traffic flow is, the higher the driver's travel cost is. If the two drivers adopt the same strategy (following the path induced or choosing the original path), then the traffic flow of the selected path will be greater than that of the non-selected paths, therefore the cost will also be higher than that when choosing a different path [6].

3.1. Symbol Definition

(1) Randomly selecting two drivers from the driver group, which are named as game party 1 and game party 2 ;

(2) The path selections of each individual driver form a collection named as S, and $S = \{s_1, s_2\}$. s_1 represents following the induced information and s_2 represents

not following the induced information;

(3) The symbol π represents the driver's revenue of each travel, namely, the negative expenditure. Symbol π_{11}^{1} represents the revenue of game party 1 when both parties 1 and party 2 choose selection S_1; symbol π_{12}^{2} represents the revenue of game party 2 when party 1 chooses selection S_1 and party 2 chooses selection S_2. According to previous analysis, the revenue of diver when the two drivers choose the same path is less than that when they choose different paths, so here is $\pi_{11}^{1} < \pi_{12}^{1}, \pi_{22}^{1} < \pi_{21}^{1}, \pi_{11}^{2} < \pi_{21}^{2}, \pi_{22}^{2} < \pi_{12}^{2}$.

3.2. The Evolution Model of Drivers' Path Selection Mode under Induced Information

3.2.1. Model Construction: In the driver group throughout the city transportation system, the individual driver has two pure strategy choices: to follow or not to follow induced information. Therefore, the game of the driver group under the condition of induced information is essentially the symmetrical evolution game of the interaction of single population. Each game is a follow-induced game or non-follow-induced game between one member of the group and another member. Let $x(t)$ represents the ratio of driver's choosing mutation strategy 1 (follow-induced) at the future time t, then $1-x(t)$ represents the radio of driver's choosing mutation strategy 2 (non-follow-induced). The strategy selection games of drivers' are symmetric games of single population, and the matrix of revenue produced is as shown in Table 1, [7].

Table 1. The Revenue Matrix of Single Population Path Selection

	game party 2		
game party 1	path selection	following induced information	not following induced information
	following induced information	$\pi_{11}^{1}, \pi_{11}^{2}$	$\pi_{12}^{1}, \pi_{21}^{2}$
	not following induced information	$\pi_{21}^{1}, \pi_{12}^{2}$	$\pi_{22}^{1}, \pi_{22}^{2}$

With the development of the technology of Internet of Things, the publishing technology of variable message signs (VMS) has become an important way of transportation integrated management in many international cities. Studies have shown that different induced information will have different effects on the path selection behavior of drivers who are more sensitive to the accurate information. The compliance rate of induced information increases with the integrity of the information itself. That is, there is a positive correlation between the probability of the driver to choose the induced path and the completeness and accuracy of the induced information [8].

After considering the influence on drivers' path selection exerted by different induced information, the revenue matrix of game parties is shown as Table 2:

Table 2. The Revenue Matrix of Single Population under Different Induced Information

	game party 2		
game party 1	path selection	following induced information (p)	not following induced information (1-p)

	following induced information (p)	π^1_{11}, π^2_{11}	π^1_{12}, π^2_{21}
	not following induced information (1-p)	π^1_{21}, π^2_{12}	π^1_{22}, π^2_{22}

Transportation systems develop and evolve with the extension of time in the interaction of internal and external information and other kinds of factors. The drivers in the system repeatedly perform behavioral games at every stage, so there is evolutionary game process. Based on the selection rules of biological system, the group replication dynamic situation of the evolutionary game theory is supposed to be as follows: the growth rate of a certain strategy dependents on its fitness and the strategy with higher revenue has a higher growth rate. According to the evolutionary game theory, the growth rate of choosing strategy 1 represented as $x^{'}(t)/x(t)$ is equal to the difference between the current revenue (fitness) and the current overall average revenue (fitness) (hereinafter $x(t)$ is abbreviated as x). Let W represents the fitness of driver choosing the pure strategy 1 and $\overline{W}$ represents the current overall average fitness.

Therefore, the fitness W of game party 1 choosing strategy s_1 (following induction) is represented as:

$$W = p^1 A[x, 1-x]^T \tag{7}$$

The symbol $p^1 = (p, 0)$ represents that game party 1 chooses to follow induced strategy with a probability of p, and A represents the revenue matrix of game party 1:

$$A = \begin{bmatrix} \pi^1_{11} & \pi^1_{12} \\ \pi^1_{21} & \pi^1_{22} \end{bmatrix} \tag{8}$$

Then there is:

$$\begin{aligned} p^1 A[x \quad 1-x]^T &= [p, \quad 0]\begin{bmatrix} \pi^1_{11} & \pi^1_{12} \\ \pi^1_{21} & \pi^1_{22} \end{bmatrix}[x \quad 1-x]^T \\ &= p\left[x\pi^1_{11} + (1-x)\pi^1_{12}\right] \end{aligned} \tag{9}$$

The average fitness of game parties $\overline{W}$ is represented as:

$$\begin{aligned} \overline{W} &= [x, \quad 1-x]\begin{bmatrix} p & 0 \\ 0 & 1-p \end{bmatrix} A[x, \quad 1-x]^T \\ &= [x, \quad 1-x]\begin{bmatrix} p & 0 \\ 0 & 1-p \end{bmatrix}\begin{bmatrix} \pi^1_{11} & \pi^1_{12} \\ \pi^1_{21} & \pi^1_{22} \end{bmatrix}[x, \quad 1-x]^T \\ &= px^2\pi^1_{11} + x(1-x)(1-p)\pi^1_{21} + px(1-x)\pi^1_{12} + (1-p)(1-x)^2\pi^1_{22} \end{aligned} \tag{10}$$

According to the definition of replication dynamic equations in evolutionary games, the growth rate $x^{'}/x$ of game party 1 choosing strategy S_1 (following induction) should satisfy the following formula:

$$x^{'}/x = W - \overline{W} \tag{11}$$

Namely:

$$x^{'}/x = (1-x)\left\{x\left[p\pi^1_{11} - (1-p)\pi^1_{21}\right] + (1-x)\left[p\pi^1_{12} - (1-p)\right]\pi^1_{22}\right\} \tag{12}$$

Finishing available:

$$x^{'} = x(1-x)\left\{x\left[p\pi^1_{11} - (1-p)\pi^1_{21}\right] + (1-x)\left[p\pi^1_{12} - (1-p)\pi^1_{22}\right]\right\} \tag{13}$$

Making $l = p\pi^1_{11} - (1-p)\pi^1_{21}, m = p\pi^1_{12} - (1-p)\pi^1_{22}$, and l,m is the single population stable equilibrium parameter (SPSEP). According to the l,m expression, it is easy to know that l,m actually represent the revenue differences of game party 1 when he chooses induced strategy and when he does not, respectively, under the condition of game party 2 choosing induced strategy or choosing non-induced strategy, which are referred to as in this paper the relative revenue of game party 1 following induction and the relative revenue of game party 1 not following induction.

Analysis has shown that induced information system is not always advantageous to traffic network system. The release of the travel information should dependent on the specific circumstance of road.

Table 3. The Corresponding Parameter Symbols of Road Sections under Different Road Circumstances

	l	m	road condition
congestion evacuation	greater than 0	greater than 0	Alternative road is not busy
congestion block	less than 0	less than 0	Alternative road is busy
supersaturated traffic flow assignment	less than 0	greater than 0	Alternative road is close to saturation (easy to cause shift blocking phenomenon)

In the background of Internet of Things, the values of l and m at each crossroad can be obtained thorough real-time data calculation. In the first situation, very clear traffic flow message will be released and the driver will choose the induced path according to the above simulation results. So finally the optimum of the system will be achieved. The second situation indicates that the road section near the road that will jam is also busy. So it is necessary to predict in advance, then assign or control the traffic flow. In the second situation, it is necessary to adjust the strength of induced information and coordinate with control methods to improve the effects of evacuation [9].

Based on the conclusions above, there will be a partial shift blocking phenomenon. That is, the released prediction about traffic flow may finally evolve into other states other than the predicted states. In this situation, we need to get an induced strategy with a stable state and make people assign traffic flow according to this strategy so as to achieve optimization. The standard of this practice is the system optimization.

When the predicted traffic flow of a road section exceeds its traffic flow capacity, subdivided situations are as follows:

(1) When the adjacent road sections can accommodate the extra traffic flow, according to the above conclusions of evolutionary games, the traffic flow assignment effect can be achieved as long as a detailed predication of traffic flow conditions is released to guide drivers to choose the low-cost route.

(2) When the adjacent road sections being predicted is also in congestion, drivers generally choose not to follow induced routes and to maintain the original planned routes. Thus induction will lose its effectiveness for traffic jams. By this time, the evacuation of congested traffic flow can only achieved through traffic flow control.

(3) When the traffic flow of the adjacent road sections is nearly saturated, the traffic flow can be reasonably assigned through the release of appropriate induced information.

4. Research on the Efficiency of Complex Road Network and the Evaluation of Beforehand Evacuation

4.1. Evaluation Index

There are numerous microscopic simulation evaluation indexes of crossroads in road network. Therefore the following aspects should be considered when choosing indexes. After comprehensively reading the researches at home and abroad, this paper argues that the indexes of microscopic traffic simulation system that can be evaluated are as shown in the following table.

Table 4. The Evaluation Indexes of Microscopic Simulation

object	index
efficiency	capacity
	average delay time
	saturation
	average parking rate
	queue Length

4.2. The Evaluation of Beforehand Evacuation in Urban Traffic Network

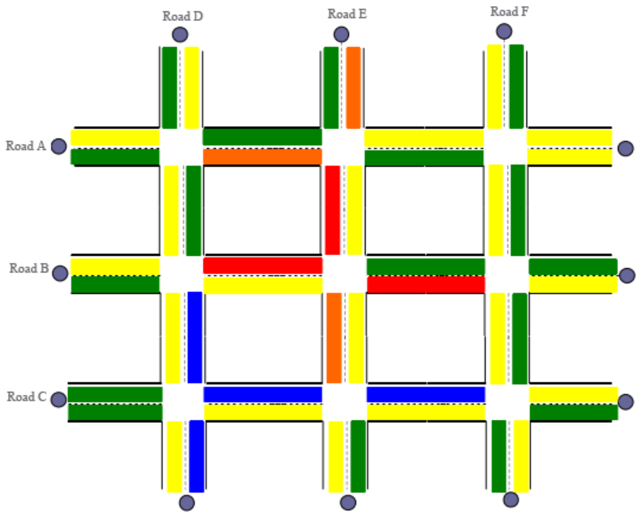

Figure 4. Schematic Diagram of Road Section Congestion in Simulation Network

In this section, the three-vertical and three-lateral network is taken as the simulation regional traffic network. In the simulation traffic network, there are 6 roads in total (12 two-way roads), 9 crossroads, 12 starting points and 48 road sections. Suppose the traffic flow capacity, the physical characteristics and the degree of importance of each road are the same. The two end points of each road are the starting and final points. Assign to each road section of the simulation area corresponding physical attributes and traffic flow, including (the capacity, the intervals of enter vehicle). Set channelization matrixes at each crossroad. Considering that our experiments are carried out in a short time, the channelization matrixes are assumed to be unchanged. With the absence of induced information, drivers take the shortest distance as the principle of moving behaviors. However, after the induced information is accessible, drivers take the shortest time as the principle of moving behaviors.

The movement simulation model can obtain traffic flow parameters of every simulation period. According to "Urban Traffic Management Evaluation Indexes System" of Ministry of Public Security, we can get the congestion indexes of each road section in traffic network. Its schematic diagram is as shown in Figure 4, in which red indicates severe congestion, orange serious congestion, yellow represents slight congestion and green no congestion.

When the system performs no traffic management behavior, traffic flow evolves in the existing hardware and principle model. The simulation model selects traffic flow data every fixed step size to calculate the traffic congestion index of the traffic network, which is represented by red line in the following Figure. After induced behavior is implemented by traffic management, drivers will receive complete information and the shortest time will be regarded as the moving principle. Thus the channelization matrix at each crossroad will be changed, so will the evolution path. After some time, the condition of congestion will slowly be improved. The overall congestion index of traffic network is indicated by blue line in the following Figure. According to the actual conditions of traffic network, integrated transport management behaviors such as inducing and traffic control will be enforced on simulation model. Based on the traffic flow prediction in traffic network, the channelization matrix of traffic flow will be changed through information inducing, which will also bring changes to the evolution process of traffic flow. At the same time, based on the obtainment of real-time traffic flow at each road section, traffic signal timing will dynamically be adjusted and traffic flow input will also be adjusted. Based on the above combined effect, the post-evacuation overall congestion index of traffic flow will be achieved, which is represented by green line in the following Figure.

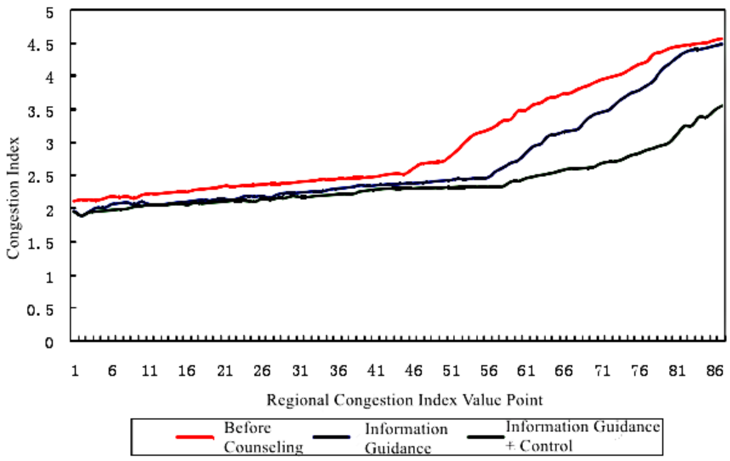

Figure 5. The Simulation Effect Map of Urban Congestion Evacuation

From the figure, the effect of information inducing is as shown by the blue line, which is quite obvious in intermediate congestion and serious congestion (the congestion index is between 2 and 4). In severe congestion where most roads are blocked, the effects of pure information inducing on the evacuation of traffic congestion are quite limited. The reason is that the congestion index in traffic network at this time has reached above 4 which is the symbol of severe congestion. In this situation, information inducing will only lead to shift blocking phenomenon. In this case, congestion condition can not be improved through internal optimizing of traffic network. Therefore, the way of signal control should be adopted to manage the supply and demand of traffic flow. The combined strategy of control and induction should also be used to carry out beforehand evacuation. The evacuation effect is represented by green line in the Figure where the congestion index of severe congestion is significantly controlled after the evacuation.

According to the number of congested road sections per unit time in the Figure, it is easy to see that the number of congested roads under non-evacuated and non-controlled environment is always greater that under beforehand evacuated environment.

Table 5. The Situation of Congestion at Each Crossroad

item	average parking rate			average queue length (m)			average delay time(s)		
serial number	no evacuation	information inducing	Inducing + control	no evacuation	information inducing	Inducing + control	no evacuation	information inducing	information inducing
1	0.36	0.32	0.30	36	24	24	90	64	60
2	0.42	0.29	0.32	42	30	28	96	71	68
3	0.38	0.31	0.34	46	32	30	108	75	70
4	0.46	0.32	3.1	48	36	32	106	79	70
5	0.45	0.33	0.28	46	35	33	110	88	75
6	0.48	0.36	0.29	49	38	34	112	86	74
7	0.52	0.38	0.30	52	39	36	123	89	76
8	0.54	0.37	0.32	46	38	38	136	98	79
9	0.50	0.38	0.34	56	42	39	145	106	86
10	0.48	0.4	0.38	60	44	40	150	108	94

5. Conclusion

Urban congestion is becoming more and more intensified. With regard to this problem, this paper makes traffic flow predications based on the intelligent transport and the real-time data collected through Internet of Things and researches on intelligent coordination control and induced management under the technical background of Internet of Things. Given that urban traffic network is a typical complex system with the characteristics of nonlinear, randomness, uncertainty, and strong variability, this paper constructs a short-term network traffic flow predication method which is a combination of urban traffic micro model and urban traffic macro model. Then, drivers' reaction to information inducing behavior under different situations is obtained by studying the evolution law of drivers under information inducing. This method can effectively find out drivers' driving behavior and can provide scientific theoretical basis for traffic managers' manage behavior, which makes traffic management behavior more refined. This paper also devises effectiveness evaluation system of urban traffic by using the ubiquitous and instant access characteristics of Internet of Things. This system can instantly provide the evacuation effect and the effectiveness of the entire system for traffic management.

Acknowledgements

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