Research on Routing based on Algorithm

Shuaili Wang
Hunan City University, Yiyang, Hunan, 413000, China

Abstract: As the opportunities existing network routing protocols cannot optimize a number of indicators, cannot significantly improve overall network performance and routing inefficiencies, put forth a multi-destination routing decision algorithm. By the time delay, energy consumption and cache consumption attributable additive goal attribution multiplicative target transmission rate, bandwidth attribution extreme goals, the multi-objective decision theory and the basic principles of ant colony algorithm applied to the opportunity to network.

Keywords: Algorithm; Routing; Dynamic topology

1. Introduction

Chapter 1 this article describes the related research work abroad. Chapter 2 describes the main content of MODM algorithm. Chapter 3 describes the experimental simulation algorithm for MODM. Chapter4summary of the whole text [1-3].

This paper mainly made expand and innovative work in the following areas:

For the existing routing protocols in opportunity network cannot optimize a number of indicators, cannot significantly improve overall network performance and routing inefficiencies, so a multi-destination routing decision algorithm is put forth [4-5]. Algorithm can provide a routing technology that taking the multiple routes into account and to accept and deal with different goals and different applications or routing policy makers demand under the environment of opportunity network, then making the overall performance of the routing protocols to the greatest degree of compliance policymakers expectations or application requirements, in order to improve its adaptability and scalability.

By the time delay, energy consumption and cache consumption attributable additive goal attribution multiplicative target transmission rate, bandwidth attribution extreme goals, the multi-objective decision theory and the basic principles of ant colony algorithm applied to the opportunity network, and many routing algorithm routing decisions indicators selected for providing different routing services to different application requirements or environment

Through the analysis of the status of the study,we can find: 1, the existing network routing protocols are merely an opportunity to consider a route target, it lack of comprehensive consideration of multiple routing objectives, and cannot improve overall performance; 2, the existing chance processing network routing protocols cannot distinguish the different routing requirements, only routing mechanism according to a fixed route, does not have a good adaptability.

2. Multi-Destination routing Decision Algorithm

This algorithm will be involved in two key algorithms: dynamic topology discovery based on ant colony algorithm (referred to as the search algorithm) and allocation method based on linear path appraised algorithm (referred appraised algorithm). Wherein, the search algorithm is used in a dynamic network topology, periodical search network may exist between each pair of nodes in the path, the path and collect each attribute value of each route target. Appraising algorithm is obtained in the search algorithm multiple paths between nodes in multiple routes objective constraint conditions evaluated, and gives the pros and cons between multiple paths sort. Algorithm will eventually be appraised according to the merits of sorting algorithm and gives out the best route choice decisions.

2.1. Dynamic Topology Discovery Algorithm

This algorithm is used in the network topology, periodical search network may exist between each pair of nodes in the path and the path of each individual collection route target attribute value recorded in the pheromone.

First, select the minimum transmission delay, maximize transmission success rate and minimizing energy consumption as the routing objectives, and in ant routing packets accumulated in the process of route targets for each node of the path as a route target. Where: 1, path delay is equal to the sum of path delay of each hop; 2, the path of energy consumption is equal to the sum of energy consumption of each hop ;3, the path of the transmission success rate equal to the sum of every hop transmission success rate product.

Next, determine the structure of pheromones. Pheromone ant colony algorithm a large core of this algorithm pheromone placed on the edge between any two nodes, which can be expressed as:

$$pheromone(e,m)=\left\{\left(r,\, jr_{e,m}^{u}\right)\right\}, e,m,r\in k \qquad (1)$$

Formula (1) indicates the meaning when the data packet's destination node is r, the node e to node m, this has to pheromone value, its value is the meaning of the expression: In the multi-objective constraints, this has to be selected as the destination edge node of the optimal path possibilities.

Again, clear the calculate of inspired value. Inspired values are not provided by the ants, the heuristic factor of node e represents the number of nodes in the local information unrelated to the destination node l_e, used in this Agreement degree w_h empty node and the node residual energy as inspiration r_m type information. Specific heuristic value is calculated as follows:

$$l_e = t\times w_h + p\times r_m \qquad (2)$$

Formula (2) e,m, respectively, l_e, r_m weights.

Then, determine the probability of the transfer function. During ant packet forwarding, if the destination node within the communication range, directly sent to the destination node and update the path information and the attribute values of all the routing destination. If the destination node is not within the communication range, the transfer function of probability is required to determine the next-hop node. Probability transfer function is integrated pheromone and heuristic values determined, it is calculated as follows:

$$V_{e,m}^{r}\frac{\left(l_{e,m}^{r}\right)^{a}.\left(\varpi_{e,m}\right)^{t}}{\sum_{m-1}^{m_e}\left(l_{e,m}^{r}\right)^{a}.\left(\varpi_{e,m}\right)^{t}} \qquad (3)$$

Formula (3), Ni-hop neighbors of node e is the set of nodes, $l_{e,m}^{r}$ is the node e to node m, with the edge to this destination node d pheromone, w_e, m of node e to node m, the heuristic value; parameter a and inspiration t respectively pheromone $l_{e,m}^{r}$ and values w_e, m weights, a reflecting cumulative historical ant routing information during other role, the greater its value, the more inclined to choose other ant elapsed path, the stronger collaboration between ants; T reflect inspired ant routing information in the course of the role, the greater its value, the closer the transition probability greedy rule.

Finally, set the update pheromone. Pheromone periodic updates include both attenuation and enhanced. Pheromone enhancement algorithms related with merit, merit-based algorithm described in; while pheromone decay rules are as follows:

$$l_{e,m}^{r}(u+\Delta u)=(1-q)l_{e,m}^{r}(u) \qquad (4)$$

3. Path Appraised Algorithm

The final routing algorithm is described as follows:

a) To determine the weight of each route destination, herein given by the user by the routing protocol, requires all weights sum to 1.

b) Determine the objectives of all programs for a single sort.

c) According to sequence of all the programs of each target, and the weight given to construct the weight matrix.

d) Solving the problem of binary plan according to the weight matrix.

The pseudo code shown in figure1.

```
a. ALGORITHM
b. INPUT:GRAPH DOUBLE:a,b,c
c.    OUTPUT:PATHPatls In Order[p].
d.    PROCEDURE METRIC()
e.    ANT Ants[]
f.    PHEROMONE Pheromones,
g.    INTEGER best Weights;
h.    MATRIX best Rank Matrix;
i.    FOR ←0 TO NDO
j.     AntsFromNode1[]=Ants.getAnts(i);
k.     IF (Ants From Nodel==NULL)THEN
l.    Continue;
m.    ELSE
n.    FOR ant IN Ants From Nodel DO
o.    Dclays add(ant, host, ant. delay);
p.    Pdrs. add (ant, host, ant. pdr)
q.    Energys.add(ant, host, ant. pdr)
r.    Energys. add(ant, host, ant, energy)
s.    REPEAT
t.    Sort(delays)
u.       Sort(pdrs)
v.       Sort(energys);
w.    Construct Weight Malrix(delays, pdrs, energys);
x.       FOR  TO Ants Form Nodel DO
y.    Construct Answer();
z.            IF (best Weights <answer)THEN
Best Weights=answer. weight;
                ENDIF
              REPEAT
          REPEAT
        REPEAT
        Paths In Order, sort(Ants From Nodel[], best Rank m ATRIX)
     ENDIF
FOR path IN Paths IN Order DO
  REPEAT
REPEAT
RETURN Paths In Order[];
END METRIC
```

Figure.1. Based On Linear Assignment Algorithm Pseudo Code Path Appraised.

4. Analysis

In this study three routes by adjusting the target (maximum transmission rate, minimize transmission delay and minimizing power consumption than) , analyzing the effect of the weight adjustment on the performance of routing algorithms, and the validation of the algorithm is based on the results of different requirements for routing control. Simulation parameters are set as shown in Table 1.

Table.1. Scene Parameter Configuration Table.

The parameter types	Parameters of the initial value	The parameter types	Parameters of the initial value
The simulation time	8000s	The cache size	100kB
Packet size	5kB	Transmission radius	10m
Data packet interval	5s	Bandwidth size	2Mbps
The simulation update interval	0.2s	Movement speed	1.5m/s
Pheromone weight	2	Inspired by the factor weights	5
Pheromone volatilization coefficients	0.4	The ant packet interval	6s
Mobile model	Based on the shortest path map mobile model		

In this experiment, the weight ranges of three routes target are 0.1-0.9, when the being modulated target weight is determined, the other two goal's weight is evenly distribute weight, the corresponding take 0.45-0.05.

5. Conclusion

Because MODM is the route of a single copy, while the single-copy routing to be generally better than multiple-copy routing in energy consumption, so MODM algorithm is superior to Epidemic in energy consumption. Thus, it can be seen from the experiment that MODM algorithm can ensure the optimum combination of properties for different applications, while a plurality of route targets needs

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