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Heuristic Algorithms based Path Selection in QoS

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Abstract: - A common approach is to discretize (i.e., scale and round) the link delay or link cost, which transforms the original problem to a simpler one solvable in polynomial time. The efficiency of the algorithms directly relates to the magnitude of the errors introduced during discretization. In this paper, we propose two techniques that reduce the discretization errors, which allow faster algorithms to be designed. Reducing the overhead of computing constrained shortest paths is practically important for the successful design of a high-throughput QoS router, which is limited at both processing power and memory space. Our simulations show that the new algorithms reduce the execution time.

I. Introduction

One common technique of the above algorithms [1], [2], [3-5] is to discretize the link delay (or link cost). Due to the discretization, the possible number of different delay values (or cost values) for a path is reduced, which makes the problem solvable in polynomial time. The effectiveness of this technique depends on how much error is introduced during the discretization. The existing discretization approaches have either positive discretization error for every link or negative error for every link. Therefore, the discretization error on a path is statistically proportional to the path length as the errors on the links along the path add up. In order to bound the maximum error, the discretization has to be done at a fine level, which leads to high execution time of the algorithms.

Given the limited resources and ever-increasing tasks routers, it is practically important to improve the efficiency of the network functions. While QoS routing is expensive due to its nonlinear nature, it has particular significance to reduce the router's overhead in computing the constrained shortest paths. In this paper, we propose two techniques, randomized discretization and path delay discretization, which reduce the discretization errors and allow faster algorithms to be designed. [6-10]

The randomized discretization cancels out the link errors along a path. The larger the topology, the greater the error reduction. The path delay discretization works on the path delays instead of the individual link delays, which eliminates the problem of error accumulation. Based on these techniques, design fast algorithms to solve the - approximation of the constrained shortest-path problem. We prove the correctness and complexities of the algorithms. [11-15]

II. Problem Definition

Path Delay Discretization:

Each unit of discretized delay represents the amount r/λ of real delay. Due to rounding, each time discretization is performed, a discretization error up to r/λ is introduced between the discretized delay and the real delay. The maximum discretization error of a path is determined by the number of times that discretization is performed on the path. RTF, RTC, and RR perform discretization at the link level. Because discretization is carried out on each link, the maximum error on the path is linear to the path length. In order to achieve ε-approximation, the accumulated error on a path cannot be too large. There are two ways to reduce the error. One is to use a larger, which increases the execution time of an algorithm whose complexity is linear to λ. The other way is to reduce the number of discretizations performed on the path.

Our second technique to control error is to perform discretization on the path level, using the interval partitioning method for combinatorial approximation. For a path P, ideally, discretization is performed once as follows.

$$d'(P) = \left\lfloor \frac{d(P)}{r}\lambda \right\rfloor$$

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Because only one discretization is performed, the maximum discretization error on any path is bounded by r/λ, independent of the path length.

We design the path discretization algorithm (PDA) based on the above intuition. The algorithm solves the ε–approximation with the same worst-case complexity as RDA. However, its average execution time is better than RDA according to our simulations.

III. PERFORMANCE ANALYSIS

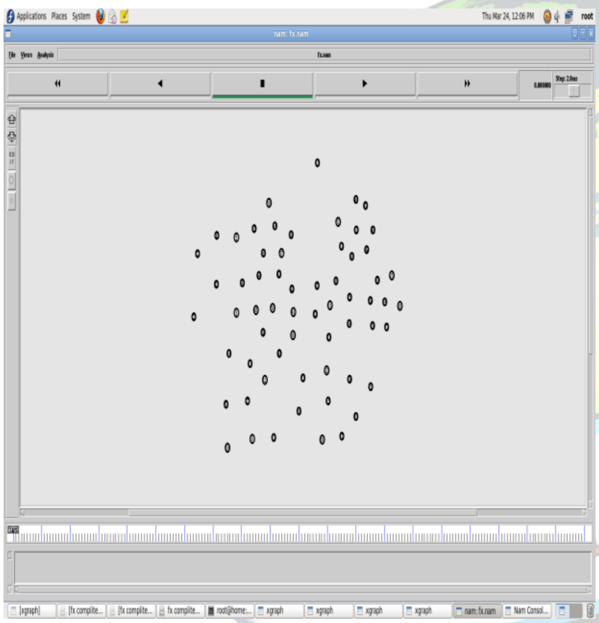

Fig 1 Creation of nodes

Checking the Malicious Node

In the above fig 2 after removing malicious node from the group the cluster head will be check whether the malicious node will be present not and watchdog also after checking that data will be transfer from the source to destination

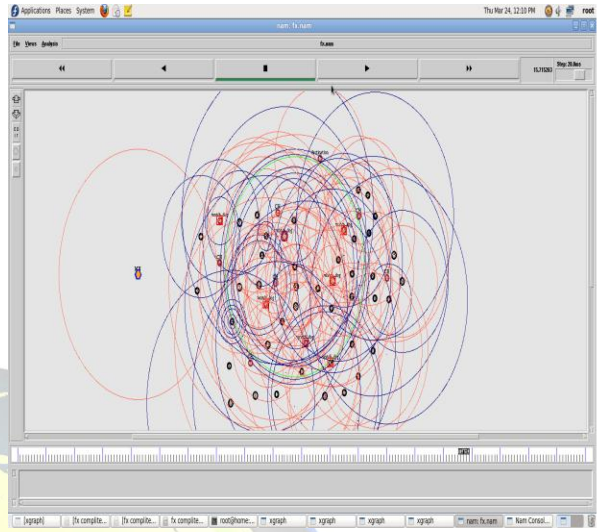

Fig-2 Checking the Malicious Node

A. Graphical Representation

Losses

In this graph is shown Fig 4 the difference between energy loss and proposed loss. The red color indicates energy loss and green color indicates the proposed system loss.

Table 1 Losses

S.No	Existing System		Proposed System	
	Time	Energy	Time	Energy
1	0.0000	0.0000	0.0000	0.0000
2	10.0000	0.7000	10.0000	0.3800
3	20.0000	0.8200	20.0000	0.6200
4	30.0000	1.1800	30.0000	0.8500
5	40.0000	1.3500	40.0000	1.0000

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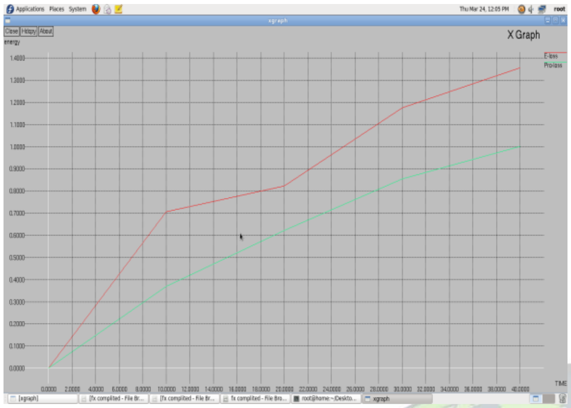

Fig-3 Losses Graph

IV. Conclusion

In this paper, we proposed two techniques, randomized discretization and path delay discretization, to design fast algorithms for computing constrained shortest paths. While the previous approaches (RTF and RTC) build up the discretization error along a path, the new techniques either make the link errors to cancel out each other along the path or treat the path delay as a whole for discretization, which results in much smaller errors. The algorithms based on these techniques run much faster than the best existing algorithm that solves the ε-approximation of DCLC.

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