A Review on Efficient Cache-Supported Path Planning on Roads (Ppr)
Chitturi Prasad & B Venkata Ramana

1M.Tech, Department of CSE Priyadarshini Institute of Technology and Science, Chintalapudi, India
2Assistant professor, Department of CSE Priyadarshini Institute of Technology and Science, Chintalapudi, India

1Chprasad4u@gmail.com, 2bvr9989@gmail.com

ABSTRACT:

In present day’s broad accessibility and easy availability of the global positioning system (GPS) and digital mapping of roads, road network navigation services have become a basic application on many mobile devices. Path planning (PP), a basic purpose of road network navigation services, discover a route amid the particular start location and end location. The competence of this path planning function is grave for mobile users on roads due to different dynamic scenarios, such as an unexpected change in driving direction, unpredicted traffic situation, lost or unstable GPS signals, and so on. In these scenarios, the path planning service needs to be delivered in a timely fashion. In this paper, we recommend a system, explicitly, Path Planning by Caching (PPC), to response a new path planning query in real time by proficiently caching and reusing historical queried-paths. Unlike the predictable cache-based path planning systems, where a queried-path in cache is used only when it matches perfectly with the new query, PPC leverages the partially matched queries to answer part(s) of the new query.

KEYWORDS: Spatial database, path planning, cache

RELATED WORK:

“Shared execution of path queries on road networks,” Authors: H. Mahmud, A. M. Amin, M. E. Ali, and T. Hashem

The advancement of mobile technologies and the proliferation of map-based applications have enabled a user to access a wide variety of services that range from information queries to navigation systems. Due to the popularity of map-based applications among the users, the service provider often requires to answer a large number of simultaneous queries. Thus, processing queries efficiently on spatial networks (i.e., road networks) have become...
an important research area in recent years. In this paper, we focus on path queries that find the shortest path between a source and a destination of the user. In particular, we address the problem of finding the shortest paths for a large number of simultaneous path queries in road networks. Traditional systems that consider one query at a time are not suitable for many applications due to high computational and service costs. These systems cannot guarantee required response time in high load conditions. We propose an efficient group based approach that provides a practical solution with reduced cost. The key concept for our approach is to group queries that share a common travel path and then compute the shortest path for the group. Experimental results show that our approach is on an average ten times faster than the traditional approach in return of sacrificing the accuracy by 0.5% in the worst case, which is acceptable for most of the users.

“An efficient path computation model for hierarchically structured topographical road maps,”

In this paper, we have developed a HiTi (Hierarchical MulTi) graph model for structuring large topographical road maps to speed up the minimum cost route computation. The HiTi graph model provides a novel approach to abstracting and structuring a topographical road map in a hierarchical fashion. We propose a new shortest path algorithm named SPAH, which utilizes HiTi graph model of a topographical road map for its computation. We give the proof for the optimality of SPAH. Our performance analysis of SPAH on grid graphs showed that it significantly reduces the search space over existing methods. We also present an in-depth experimental analysis of HiTi graph method by comparing it with other similar works on grid graphs. Within the HiTi graph framework, we also propose a parallel shortest path algorithm named ISPAH. Experimental results show that inter query shortest path problem provides more opportunity for scalable parallelism than the intra query shortest path problem.

“Computing the shortest path: A search meets graph theory,” Authors: A. V. Goldberg and C. Harrelson
We propose shortest path algorithms that use A* search in combination with a new graph-theoretic lower-bounding technique based on landmarks and the triangle inequality. Our algorithms compute optimal shortest paths and work on any directed graph. We give experimental results showing that the most efficient of our new algorithms outperforms previous algorithms, in particular A* search with Euclidean bounds, by a wide margin on road networks and on some synthetic problem families.

“Reach-based routing: A new approach to shortest path algorithms optimized for road networks,” Authors: R. Gutman

The problem of identifying the shortest path along a road network is a fundamental problem in network analysis, ranging from route guidance in a navigation system to solving spatial allocation problems. Since this type of problem is solved so frequently, it is important to craft an approach that is as efficient as possible. Based upon past research, it is generally accepted that several efficient implementations of the Dijkstra algorithm are the fastest at optimally solving the ‘one-to-one’ shortest path problem. We show that the most efficient state-of-the-art implementations of Dijkstra can be improved by taking advantage of network properties associated with GIS-sourced data. The results of this paper, derived from tests of different algorithmic approaches on real road networks, will be extremely valuable for application developers and researchers in the GIS community.

DISADVANTAGES:

- A cached query is returned only when it matches completely with a new query.
- The time complexity is high.
- The cache content may not be up to date to respond to recent trends in issued queries.
- The cost of constructing a cache is high, since the system must calculate the benefit values for all sub-paths in a full-path of query results.

PROPOSED SYSTEM:

To meet existing need, we propose a system, namely, Path Planning by Caching (PPC), that aims to answer a new path planning query efficiently by caching and reusing historically queried
paths (queried-paths in short). The proposed system consists of three main components: (i) PPattern Detection, (ii) Shortest Path Estimation, and (iii) Cache Management. Given a path planning query, which contains asource location and a destination location, PPC firstly determines and retrieves a number of historical paths in cache, called PPatterns, that may match this new query with high probability.

The idea of PPatterns is based on an observation that similar starting and destination nodes of two queries may result in similar shortest paths (known as the path coherence property).

In the component PPattern Detection, we propose a novel probabilistic model to estimate the likelihood for a cached queried-path to be useful for answering the new query by exploring their geospatial characteristics.

To facilitate quick detection of PPatterns, instead of exhaustively scanning all the queried paths in cache, we design a grid-based index for the PPattern Detection module. Based on these detected PPatterns, the Shortest Path Estimation module (see Steps (5)-(8)) constructs candidate paths for the new query and chooses the best (shortest) one. In this component, if a PPattern perfectly matches the query, we immediately return it to the user; otherwise, the server is asked to compute the unmatched path segments between the PPattern and the query (see Steps (6)-(7)). Because the unmatched segments are usually only a smaller part of the original query, the server only processes a “smaller subquery”, with a reduced workload. Once we return the estimated path to the user, the Cache Management module is triggered to determine which queried paths in cache should be evicted if the cache is full. An important part of this module is a new cache replacement policy which takes into account the unique characteristics of road networks.
In this paper, we provide a new framework for reusing the previously cached query results as well as an effective algorithm for improving the query evaluation on the server.

CONCLUSION:

We projected a scheme, that is, Path Planning by Caching, to respond a new path planning query with quick response by efficiently caching and reusing the chronological queried-paths. Dissimilar the conventional cache-based path planning systems, everyplace a queried-path in cache is used only when it matches perfectly with the new query, PPC leverages the partially matched cached queries to answer part(s) of a new query. As a result, the server only needs to calculate the unmatched fragment, thus significantly dipping the overall system workload.

REFERENCES:


