



[Volume XL-4](#)

Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-4, 133-137, 2014
www.int-arch-photogramm-remote-sens-spatial-inf-sci.net/XL-4/133/2014/
doi: 10.5194/isprsarchives-XL-4-133-2014

A replacement strategy for a distributed caching system based on the spatiotemporal access pattern of geospatial data

R. Li, X. Wang, and X. Shi

State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, Wuhan, Hubei, P.R. China

Keywords: Caching, Replacement, Spatiotemporal, LRU, Networked GIS

Abstract. Cache replacement strategy is the core for a distributed high-speed caching system, and effects the cache hit rate and utilization of a limited cache space directly. Many reports show that there are temporal and spatial local changes in access patterns of geospatial data, and there are popular hot spots which change over time. Therefore, the key issue for cache replacement strategy for geospatial data is to get a combination method which considers both temporal local changes and spatial local changes in access patterns, and balance the relationship between the changes. And the cache replacement strategy should fit the distribution and changes of hotspot. This paper proposes a cache replacement strategy based on access pattern which have access spatiotemporal localities. Firstly, the strategy builds a method to express the access frequency and the time interval for geospatial data access based on a least-recently-used replacement (LRU) algorithm and its data structure; secondly, considering both the spatial correlation between geospatial data access and the caching location for geospatial data, it builds access sequences based on a LRU stack, which reflect the spatiotemporal locality changes in access pattern. Finally, for achieving the aim of balancing the temporal locality and spatial locality changes in access patterns, the strategy chooses the replacement objects based on the length of access sequences and the cost of caching resource consumption. Experimental results reveal that the proposed cache replacement strategy is able to improve the cache hit rate while achieving a good response performance and higher system throughput. Therefore, it can be applied to handle the intensity of networked GISs data access requests in a cloud-based environment.

[Conference Paper](#) (PDF, 328 KB)

Citation: Li, R., Wang, X., and Shi, X.: A replacement strategy for a distributed caching system based on the spatiotemporal access pattern of geospatial data, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-4, 133-137, doi: 10.5194/isprsarchives-XL-4-133-2014, 2014.

[Bibtex](#) [EndNote](#) [Reference Manager](#) [XML](#)

