

A ROBUST PRE-FETCHING ALGORITHM FOR SCALABLE WEB CONTENTS AND ITS PERFORMANCE EVALUATION

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ABSTRACT. *In order to deliver multimedia contents to the end-users with low delay and acceptable quality, the pre-fetching technologies have been shown the efficiency if we can predict user's future requests and prefetch the data needed previously. However, because both the network topology and Web access are changed dynamically, whether the pre-fetching can get the stable performance under dynamic environment becomes an important issue. Therefore, this paper talks about the robustness of the pre-fetching algorithm, which has been proposed by us to deliver layered image contents over the Internet. Based on the web access distribution, the request pattern in the scalable imaging delivering system is analyzed in this paper. Furthermore, we check the robustness of our proposal by changing related parameters. Simulation results show that our proposal is stable against variable conditions even if access patterns are dynamically changed.*

Keywords: Contents delivery, Hierarchical image coding, Pre-fetching, Web caching

1. **Introduction.** Recent studies show that pre-fetching scalable (layered) multimedia can get good performance in delivering Web contents over the Internet. The reason can be found as follows: on one hand, If the scalable format is carried out to deliver Web contents, the compression ratio of the scalable data can be easily changed according to available bandwidth, e.g., when the network congestion is worsen, the sender can send few number of layers to maintain the continuous playback at a receiver; conversely the number of layers can be increased when network conditions become better. On the other hand, Pre-fetching is helpful to reduce user-delay. If we can predict a given object to be requested by the user, pre-fetch it from the server to the cache will reduce the delay because of the data's local available.

With the development of Web Technologies [27-31], both the network topology and Web access are dynamically changed more than before. The robustness of pre-fetching becomes more necessary. For example, the unnecessary pre-fetching is likely to take more network traffic with the network.

Based on the above background, we propose a pre-fetching scheme for image delivery system, in which a variable amount of memory is assigned to each image by using scalable (layered) coding format. However, the request pattern has not been analyzed and the robustness of the proposal has not been tested either.

In this paper, we first make an analysis of the access pattern when the user requests layered image data. The probability of accessing each layer of each image is given. Then we test the robustness of our proposed algorithm, in which a progressive JPEG format is used. In our preliminary experiments, the related parameters are changed dynamically in order to obtain a dynamic access environment. We also compare our proposal with the