

Chameleon: A URICA prototype for Image Fidelity Adaptation

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1 INTRODUCTION

Mobile devices, such as cell phones and network-enabled personal digital assistants (PDAs), are increasingly being used to access Web content. Unfortunately, most Web content is intended for consumption on powerful desktop computers, and has to be customized to meet the resource constraints (such as network bandwidth, display size, user interface, storage, and battery life) that are typical of mobile devices. This problem is exacerbated by the high degree of heterogeneity in the capabilities of mobile devices.

We have developed the Usage Aware Interactive Content Adaptation (URICA) technique that automatically adapts content for mobile users based on both their requirements (usage) as well as their situation (context). URICA is a general-purpose adaptation technique, and can be used for a wide range of customizations, such as adapting the layout of web pages to fit the small screens of handheld devices, or reducing the fidelity of objects to better utilize a low-bandwidth network link. At a high-level, URICA works as follows: when serving content for the first time, the system applies an initial customization to the content. Subsequently, users who are unsatisfied with the system's adaptation decision can take control of the adaptation process and make changes until the content is suitably adapted for their purposes. The successful adaptation is recorded and becomes part of the history that is used in making future adaptation decisions for other users.

In our demonstration, we propose to show Chameleon, a URICA prototype for image fidelity adaptation that we are currently deploying on a large scale.

2 CHAMELEON

Chameleon is a URICA prototype for adapting the fidelity of images on web pages. At present, we are in the process of deploying the system for users who have low-bandwidth, high-latency, or costly network links to the Internet [1]. As users browse the web, their requests are routed to an adaptation proxy. The adaptation proxy downloads content from web servers, transcodes all images, and serves them to the user with reduced fidelity. The user can subsequently request improvements in the fidelity of images.

In our current implementation, the client-side interactive adaptation features of Chameleon are provided via a plug-in for Mozilla Firefox. The browser is configured to route all HTTP traffic to the adaptation proxy, which is a modified pass-through Squid proxy [2]. We have augmented Squid so that it transcodes JPEG, Bitmap and GIF images into progressive JPEG format, and can serve these at various fidelity levels. When a user requests a refinement, these are transmitted as deltas to avoid any wastage. We use a Nortel Networks load balancing switch to distribute incoming client requests across seven instances of the adaptation proxy. The proxies are distributed across four 64-bit 3.1Ghz dual core Xeon systems that use Red Hat Enterprise as the OS.

3 DEMONSTRATION

We will allow participants to browse the web on a laptop computer, using a browser with Chameleon installed. Users will initially see low fidelity versions of images on web pages, and can interactively improve their quality. For example, the fidelity of individual images can be improved by clicking on them using the middle mouse button. Chameleon also allows increasing the fidelity of all images on a web page in a single operation. Users can also change the default fidelity at which images are served.

4 REQUIREMENTS

For our demonstration, we will require a table, a network connection to the Internet and a power bar with 3-4 outlets. The following would be desirable but are not necessary: a projector/screen, and use of a phone that has unlimited Internet access (to be used as a wireless modem for the laptop). We will provide all other equipment.

REFERENCES

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