Chapter 17

MULTIMEDIA ADAPTATION AND BROWSING ON SMALL DISPLAYS

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Guan Zhong Kui Bao, Shi Jian Yi Ban - a famous Chinese saying. It is usually used to mean understanding the whole picture by only seeing parts of it, similar to the English saying "seeing the forest through the trees."

—Yiqin Liu, 420AD-480AD

Abstract

As a great many of new devices with diverse capabilities are making a population boom, their limited display sizes are becoming the major obstacle that undermines the usefulness of these devices for information access. In this chapter, we introduce our recent research on adapting multimedia content including images, videos and web pages for browsing on small-form-factor devices. A theoretical framework as well as a set of novel methods for presenting and rendering multimedia under limited screen sizes is introduced to improve the user experience. A system framework has also been proposed to provide the content modelling and processing as subscription-based web services on the Internet.

Keywords: Small display, content adaptation, attention model, mobile device, edge computing, content delivery networks
1. Introduction

In the PC+ era, a variety of new computing devices, such as SPOT watch, smart phone, Pocket PC, Tablet PC, etc, are making a population boom. These devices are becoming more and more powerful in both numerical computing and data storage. However, low bandwidth connections and small displays remain two serious obstacles that undermine the usefulness of these devices in people’s everyday lives. With the rapid and successful development of 2.5G and 3G wireless networks, the bandwidth factor is expected to be less constrained in the near future. However, the limitation on display size is likely to remain unchanged in the foreseeable future.

Since most of the information on the Internet is presented by multimedia, improving the experience of multimedia access and browsing on small displays is critical for unleashing the power of these mobile devices. Existing research directions to address this problem can be classified into following four categories:

- **Trivial methods.** For example, direct down-sampling of image or video in the spatial domain. This approach often decreases the user experience since the results may be unreadable or unacceptable.

- **Authoring multiple versions.** For example, building separate, dedicated mobile web sites for small devices. This approach results in additional burdens on content management. Also, it is hard to predict what devices will emerge in the market and the solution could be transient.

- **Re-authoring the content offline or on-the-fly.** This approach depends on the extraction of the original semantic structure of the content. Certain success has been achieved in certain areas but generally it is a hard problem because of the nature of reverse engineering.

- **New formats which are scalable by themselves.** This is the most promising direction and has been adopted in many areas, such as scalable image and video coding. However, current research efforts are less focused on the problem of diverse and small displays, and there is much space for improvement on multimedia browsing techniques.

In this chapter, we focus on the latter two approaches since they are more preferred by content authors or consumers. In fact, these two schemes are related to each other. The intermediate representation used in content re-authoring should be flexible and adaptive to the display size. Therefore, it will be referential when standardizing a new scalable format.