

Hardware-based Image Retrieval and Classifier System

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Abstract — Images are an important class of data. The World Wide Web is presently regarded as the largest global multimedia data repository, encompassing different types of images in addition to other multimedia data types. As a matter of fact, much of the information communicated in the Web is in the form of images. Image databases are typically very large. There has been much progress in the development of text-based search engines for the Web. However, search engines based on other data types either do not exist or are not well developed. The Web is a collection of billions of documents written in a way that enables them to cite each other using hyperlinks, i.e., in hypertext. These documents are typically a few thousand characters long. In this paper, we present the development of automated programs that can analyze and classify images found in these documents. To do so, a Web crawler (also called a “spider”, mobile agent, or “bot”) is utilized. This agent is developed using the Xilinx Embedded Design Kit (EDK) and runs on a network of PCI-based development boards utilizing the Xilinx Virtex-II Pro device with two embedded Power PC’s. The software agent searches the documents for HTML keywords such as “img” of type jpg, gif, etc., and stores the images on the host computer’s hard disk. When the agent completed its task, the images are classified by the hardware image processing modules implemented on the Virtex-II Pro boards. The image processing modules include spatial filters, frequency domain filters, edge detectors, discrete wavelet transforms, and vector comparators. Based on the contents, the images are then classified using parametric and non-parametric methods.