Product Review: The Coreco Oculus-500 Imaging System

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Recent developments in computer imaging technology have brought about significant improvements in the display resolution and capabilities of desk-top imaging systems. The Coreco, Inc. Oculus-500 is a group of high resolution imaging boards for use with IBM-AT and compatible computers. The tested $8000 system consists of a 2 Mb interface board, display/controller board, driver, toolkit, and software interface package. With a display resolution of 1280 x 1024 @ 60 Hz non-interlaced, the OC-500 offers excellent resolution. The accompanying software is being further developed by a responsive company, but can in places be tedious to use. However, the result of understanding the software is a system with superb capabilities.

KEY WORDS: imaging; autoradiography; pixel; resolution.

INTRODUCTION

High resolution imaging systems are rapidly becoming an indispensable basis for quantitative autoradiography. Imaging systems have capabilities which, until recently, were available only on minicomputers. By digitizing quantitative autoradiographs, important regional metabolic information can be obtained. In addition, software programs which pseudocolor and enlarge the image improve the visualization. Imaging systems allow users to examine and modify both groups of pixels and individual pixels. For a system with a display of 1280 x 1024, such as the Oculus-500 (OC-500), there are 1.3 million pixels on the screen. So, high resolution imaging systems also need large number crunching ability.

For medical purposes, an imaging system works as follows: a slide or autoradiograph is mounted directly beneath a camera which is connected to an image processing board. The user then "grabs" the image, which causes it to appear on a high resolution monitor. The main menu is displayed on a VGA monitor. The image can then be stored in monochrome using 256 levels of gray intensity. Because most images require 1-2 Mb of storage, a fair amount of memory is necessary on the hard drive.

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Coreco, Inc. is a Canadian-based company which produces a series of high resolution imaging boards. Its top-of-the-line boards are called OC-500, and are for use with IBM-AT and compatible computers. The OC-500 is comprised of one interface and one display/controller board. (An optional 2 Mb overlay board is also available.) Several pieces of accompanying software, including a driver, toolkit, and interface package, were tested with the OC-500 imaging boards. As a high-resolution processor, they can capture images up to 2048 x 1024 pixels and display them at 1280 x 1024 @ 60 Hz non-interlaced refresh rate. (Interlaced processors scan alternate lines on the screen each time the screen is redrawn, whereas non-interlaced programs scan every line.)

The OC-500 was tested on a PC Brand 386 SX16 with a 80387 co-processor. A Kodak Videk Megaplus Camera captured the images with a resolution of 1320 x 1035. It features an 8 bit A/D converter which produces a digital output of 256 gray levels. Since 100% of the sensor area is light sensitive, aliasing is dramatically reduced. The Videk Megaplus Camera comes with its own power supply and a Nikor lens mount. The system was tested with a Micro Nikor 105 mm F 2.8 AF lens fitted with an "M" tube. This "state of the art" combination functioned flawlessly. A Mitsubishi Diamond Scan 16" color high resolution monitor displayed these images with a resolution of 1280 x 1024. Since the OC-500 displays images with a resolution of 1280 x 1024, there was no advantage in using a camera or monitor with higher resolution.

An essential component of this high resolution imaging system is a stable light source whose intensity does not vary over time and which has even illumination over the field. The light source must be capable of being set at the same level of illumination each time it is used. For this application, a halogen bulb was installed in a twelve inch spun aluminum sphere. The spherical shape insured uniform light distribution through a three inch hole. The inside of the sphere is coated with micropolarized barium sulfite. This compound is a good reflector, which also diffuses the light. This light source is available from Scientific Imaging, Inc.

DESCRIPTION OF SOFTWARE FEATURES

The main menu is divided into three sections: utilities, grab & display, and demonstrations. The utilities menu is mainly for file transfer and hardware configuration. Grab and display allows the user to display the image in real-time. And demonstrations shows such examples as histograms and morphological operations. The only tools to manipulate the image directly from the main menu are the zoom and interactive cursor. The rest of the tools are available by moving to a command line.

Zoom causes a small, movable window to appear on the screen. A larger fixed window (~ 180 x 180) displays the image captured within the movable window, as shown in Fig. 1. By shrinking the size of the movable window, the pixel size of the image within the fixed window appears to increase. The corresponding intensity values appear in hex notation within a matrix on the VGA monitor. For example, a 12 x 12 image within the fixed window has a corresponding 12 x 12 matrix of hex values on the VGA monitor. Although it is an awkward method of expressing pixel intensities, hex notation requires only two figures to