Image Compression for Storage and Transmission of Digitized Images

Principal Investigator:
Dr. Vladimir Cherkassky, Assoc. Professor

Department of Electrical and Computer Engineering
University of Minnesota • Twin Cities
P: 612-625-9597 • F: 612-625-4583
E-mail: cherk001@umn.edu

Why This Research is Needed

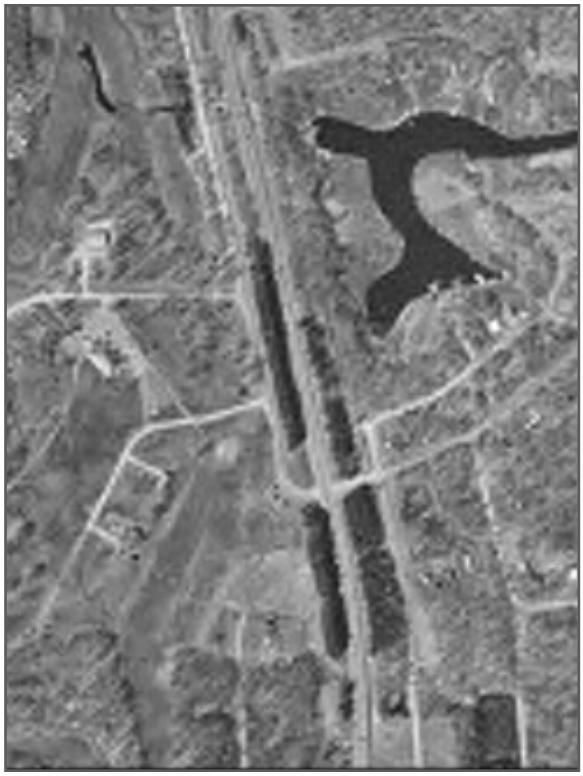
Digital imaging is one of the most important techniques for distributing information about the transportation system. The use of high-resolution digital images is hampered, however, by the low speed of typical Internet connections. Even with the gradual arrival of high-speed, high-bandwidth connections, delivering large and detailed photographic images over the Internet continues to be a challenge. Current techniques also do not offer some functions that are considered crucial to future image-intensive applications, such as the ability to "zoom" into a high-resolution image.

Research Objective

To improve the mathematical methods used by computers to compress digital images. An improved compression technique will make image files smaller, and therefore quicker to download and more economical to store electronically. The technique under development will also enable additional features to improve usability of the images.

Methodology

The first phase of the research project involved adapting a commercially available software package to meet the specific needs of the Minnesota Department of Transportation's Office of Land Management. A prototype system is currently operational, providing a limited number of sample aerial images via a web site. Users can click on an image to zoom in through several steps of magnification, without seeing significant loss of detail.



Aerial photographic images are important tools in maintaining the transportation system.

For phase two, Cherkassky and his team are focused on developing their own image compression algorithm, based on Discrete Wavelet Transform (DWT) encoding methods. Their experimental compression scheme incorporates another important feature: incremental compression, or the ability to transmit a low-resolution version of an image and follow up with progressively more detail. This capability, not offered by the commercial software used in Phase 1, will be especially important for the rapid distribution of large images over the Internet.

Research Results

The knowledge derived from this project will be used to develop better ways of transmitting and storing digital images such as aerial photographs and large, detailed maps. Improving the availability of this kind of information will enable researchers and transportation planners to develop new applications of intelligent transportation systems.

Research Impacts

In a world increasingly reliant on electronic media for the exchange of information, the work of Cherkassky's team has far-reaching implications. Transmission and compression of large image files is a common task in many applications, not only within the transportation sector. Ultimately, much of the visual material transmitted over the Internet will benefit from better compression schemes.

What's Next

The researchers are continuing to develop their own software algorithm incorporating the findings of Phase 1 of the research project.