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Reading mammograms: Less tells more

Compressed files interpreted better; Purdue professor helps develop method

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Every year, mammograms save thousands of lives by helping doctors detect and treat breast cancer.

A Purdue University scientist says that by reducing the massive volume of information presented, even more women may be helped.

The research is in today's issue of Radiology, the journal of the Radiological Society of North America.

Computer file compression doesn't necessarily improve diagnosis, says Purdue professor Bradley J. Lucier, but it allows radiologists to spot and localize features as well or better than before.

"The technology 'filters out the noise,' if you will," he said. In addition, compressed files can be transmitted, stored and retrieved more easily.

That could allow images to be electronically transferred from medically underserved areas to radiologists miles away, via mobile equipment and dial-up Internet connections.

A team of researchers, including Lucier, found that digitized mammograms -- the X-ray cross- sections of breast tissue that doctors use to search for cancer -- are interpreted more accurately after being compressed.

The techniques are similar to those used to lessen the memory demand of images in digital cameras.

Lucier developed the file compression method used in a study at the Moffitt Cancer Center at the University of South Florida in Tampa.

The research was funded in part by the Office of Naval Research, whose Mathematical, Computer and Information Sciences Division supports research on motion and still-image analysis, processing and enhancement.

Physicians still would receive the features they most need for cancer diagnosis, even from communities that lack broadband Internet access.

Such places are often underserved now, said Lucier, a professor of mathematics and computer science.

A 2001 federal study showed that the number of mammography facilities has declined in most states.

"I feel that the potential for using digital mammography to bring early breast cancer detection to underserved areas is great," said radiologist Dr. Phyllis Martin-Simmerman of the Arnett Outpatient Imaging Center.

Each day she examines digital images taken directly from raw data, plus stored compressed images from previous years.

"The compressed images are comparable to the current screen/film mammograms but do not offer the same advantage as the raw data for computer analysis and manipulation," Martin-Simmerman said. "However, this (file compression) may still be a plus for those communities where mammography is not available, particularly if you can apply the program developed at Purdue to the original data.

"I am sure that as the research continues, we will find more ways to apply digital mammography to the early detection of breast cancer, and I applaud the people dedicated to developing these applications."

Lucier said the research "strongly suggests that a clinical study would be worthwhile."

A mammogram image converted into electronic form can contain more than 50 megabytes of data, too large for transmission by computer modem over a regular phone line.

Lucier found that one well-tested algorithm -- a short set of instructions that can be repeated many times -- was effective for file compression after small adjustments were made.

On seven of nine measures of diagnostic accuracy, radiologists interpreted the compressed images more accurately than they did original images. The compressed images contain, on average, 2 percent of the information in the originals.

Lucier is optimistic that file compression might be adapted to other forms of telemedicine in which large amounts of data are involved -- such as many MRI and CT scans -- and when images are acquired by technicians and not radiologists.

In those situations, he said, "You won't actually have to have that specialist on hand if you can get the equipment to the patient."

Contributing: Purdue News Service