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CTI team developing imaging software to help doctors more quickly ID problems

A team of CTI faculty members and students is working to develop software that could save lives by helping doctors more efficiently and accurately interpret medical images generated through widely used Computed Axial Tomography scans, more commonly known as CT or CAT scans.

CT scans combine X-rays and computers to generate highly detailed, cross-sectional images of various parts of the body. While X-rays are used to view bone mass, CT scans allow doctors to examine both bone and soft tissue. Though CT scans are not performed as often as Magnetic Resonance Imaging or MRI scans, CT scans still are used in cases where doctors suspect serious head trauma, osteoporosis or cancer.

What the CTI software now in development would do is automatically classify human body tissues in CT images. The software would review an image of any part of the body and ultimately determine whether the tissue in question is normal or abnormal.

"If the computer detects perfectly normal kidney tissue, for example, the radiologist wouldn't even need to look at the image," says Jacob Furst, an assistant professor in CTI. "The ideal situation is for radiologists to never have to look at a normal image and to only look at images that need some kind of immediate attention."

Furst calls the ability to flag the scans that are abnormal the "holy grail" of medical image processing. "We're not there yet, but we're working on it."

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Furst

Raicu

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Software continued from page 1

Furst and colleague Daniela Stan Raicu, also an assistant professor in CTI, lead the research team of eight students. The work is done through CTI's Intelligent Multimedia Processing Laboratory, which is headed by Furst and Raicu. Thanks to a grant supporting undergraduate research, four of the students are undergraduates, which is rare. Usually such plum, funded research opportunities are awarded to the more advanced graduate students. CTI has submitted a grant proposal to the National Institutes of Health in hopes of securing more funding for the research.

Preliminary CT data in the software comes from two patients and is not specific to any given pathology. In other words, the results are generic scans of healthy tissue from all parts of the patients' bodies.

Working in conjunction with a radiologist at Northwestern University in Chicago, the CTI team has input normal, healthy tissue scans with descriptors that indicate the region of the body that the scan represents. "Based on the characterization of the region, the software will be able to say, 'OK, this is a heart or this is a spleen,'" explains Raicu.

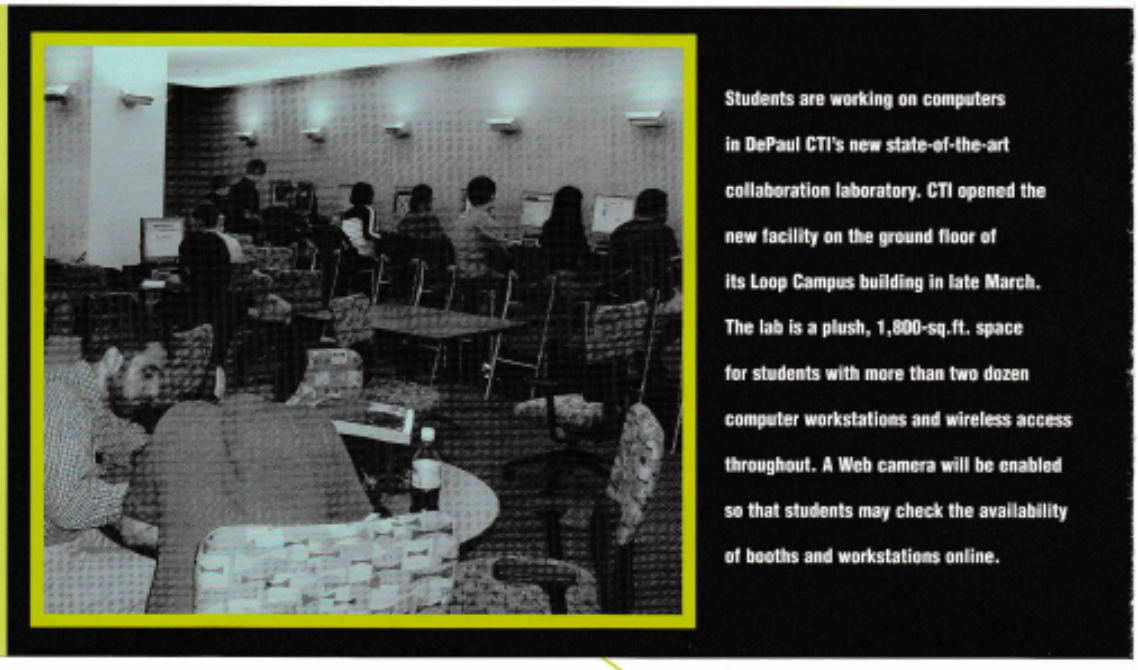
In the next phase of research, Dr. David Channin, an associate professor of radiology and chief of imaging informatics at Northwestern University Feinberg School of Medicine, will supply the team with scans of benign and malignant kidney masses to enter into the software.

"When we create decision rules for those, based on the framework, now you're talking about a machine that could automatically detect kidneys and say where and how many of these benign or malignant blocks there are," says Furst. Once the software has stored countless abnormal images of a variety of organs, then doctors can compare one abnormal image with others housed in the database.

Lynette Lilly, a graduate student on the research team, says she is thrilled to use her knowledge of data mining algorithms to solve a real-world problem.

"From a humanitarian perspective, I am excited that the system we are building will be of great benefit to doctors and their patients," she says. Lilly realized how vital her work on the project was when she recently took a friend to the emergency room. "I noticed that the doctor had to manually label the organs appearing on the ultrasound. Our system could automate the annotation process for CT images, which would save time for both doctors and patients."

Raicu notes, "Even though the software is not ready for prime-time use by doctors, the preliminary results of our research are very promising." ■



Students are working on computers in DePaul CTI's new state-of-the-art collaboration laboratory. CTI opened the new facility on the ground floor of its Loop Campus building in late March. The lab is a plush, 1,800-sq.ft. space for students with more than two dozen computer workstations and wireless access throughout. A Web camera will be enabled so that students may check the availability of booths and workstations online.