High Quality Image Solution Powers Groundbreaking Innovation in 3D Mammography

Adam Scraba, NVIDIA

Fujifilm is a global innovator across imaging and information technology, developing essential solutions for professionals in medical and life sciences, film and media, optical technology, manufacturing, nanotechnology, and more, in addition to its well-known consumer camera and film products. Established in Japan in 1934 as a film manufacturer, Fujifilm has since used its expertise in film technology and imaging to actively diversify into related markets around the world. Today, one of Fujifilm's promising innovations is in the medical field—its stereoscopic 3D digital mammogram technology [1], known as AMULET.

Challenge

Breast cancer is the most common form of cancer affecting women worldwide, with over 1.6 million new cases reported in 2010. Known as a "silent disease," breast cancer patients typically do not experience pain or symptoms until late in the game. Mammograms are recognized by medical professionals around the world as a key tool for breast cancer screening and early detection. However, even mammograms are limited in their scope and level of detail, and doctors often must subjectively estimate the location of a suspect growth within the breast tissue, which has no easy landmarks (like bones) when compared with other parts of the body. Doctors face other challenges as well—for example, since the breast tissue is so compressed upon x-ray, it can be difficult to differentiate between the various layers of tissue when examining the images, and some areas may be obscured altogether.

With these limitations in mind, Fujifilm's research and development team set out to revolutionize the mammogram. The team at Fujifilm knew that by applying stereoscopic 3D technology to the traditional mammogram process, breast cancer screenings could instantly become more detailed and more reliable. However they also knew that it was imperative for the 3D technology to run efficiently and seamlessly in order for doctors to invest time and money adopting and learning a new mammography system, and that is what made the NVIDIA Quadro GPU [2] essential to this development.

Solution

Fujifilm's AMULET is the first 3D mammography tool that is based on stereoscopic imaging. AMULET captures images at zero degree and four degree views, mimicking the left-eye/right-eye perspective employed in stereoscopic 3D filmmaking, which allows the entire breast to be scanned and evaluated with an unprecedented level of depth. The resulting image is displayed on an innovative 3D stereo clamshell monitor display, and doctors wear 3D glasses upon review.

"When developing this new mammography solution, we included NVIDIA Quadro GPUs under the hood to make it as high-powered and efficient as possible," said Akira Hasegawa, Director, Medical Research, Fujifilm. "NVIDIA’s Quadro K2000D delivers the high image quality that doctors demand to derive accurate reads, and the multi-monitor support that is essential for our 3D clamshell display configuration. Plus the fact that we can power a multi-display AMULET system with just one GPU ultimately means that we can provide a simpler and more affordable solution."

Just as human eyes see in stereovision and reconstruct images to provide depth perception, AMULET combines two 2D images and reconstructs them in ultra-high-resolution 3D—ultimately delivering a better image while still emitting the same, if not lower, amounts of radiation than a traditional mammogram. Being able to recreate the breast in stereo 3D makes it easier to differentiate between different types of breast tissue, thus providing greater accuracy in determining the exact location of the cancer.

"Healthcare is high stakes, and we knew that none of our technology components could fail," said Hasegawa. "NVIDIA's Quadro K2000D was very clearly the best choice for us to power AMULET’s 3D display – it's ultra-fast and responsive, and consistently reliable in these mission-critical situations. It really is the driving force that makes AMULET work."

Impact

Fujifilm's AMULET, already approved and in use across Europe, is quickly transforming breast cancer screenings and making mammogram imaging more intuitive. And its NVIDIA-powered 3D displays provide the high-end seamless performance that busy doctors require.

"AMULET's 3D display allows me to interpret mammograms with greater ease because it clearly delineates the edges of masses, and the orientation of

calcification is more accurate," said Dr. Pierre Alain Goumot, Radiologist and Mammography Specialist in Paris, France. "The lesion is clearly and immediately visualized in 3D with high resolution, which allows for more confidence and reduces false readings and recalls. AMULET's 3D display is very fast, it works well, and it's very convenient."

Source URL (retrieved on *07/28/2015 - 1:46pm*):
http://www.mdtmag.com/articles/2013/10/high-quality-image-solution-powers-groundbreaking-innovation-3d-mammography

Links:
[1] http://www.fujifilm.com/products/medical/mammography/3d/
[2] http://www.nvidia.com/object/workstation-solutions.html