Practical IoT: Advanced Analytics for Medical Imaging

by Gerardo Chapa, Cameron Carr and Jordan Reynolds

## Early detection is a key indicator for a patient's five-year prognosis when treating cancer.

Time matters. The faster and more accurately a doctor can analyze the image of a tumor, the quicker treatment can begin and the sooner patients are on their way to recovery.

Imagine if doctors could quickly compare and contrast images of a tumor with hundreds of thousands, or even millions, of other tumor images while diagnosing and treating cancer. With advanced Internet of Things (IoT) techologies and new deep learning techniques, doctors could do exactly that.

Request a Suggested Diagnosis Using Machine Learning

In a single year, a leading cancer research hospital in Texas generated more than half a million medical images in their fight against cancer.[1] With so many images to analyze, harnessing the power of an IoT and analytics platform to analyze rich multimedia data – such as medical images – could improve patient prognoses with earlier cancer detection and, more importantly, treatment. Leveraging the advanced analytics capabilities of PTC's ThingWorx platform, we built a use case that uses images produced from smart connected CT scanners, and a set of processes for understanding and analyzing digital images, known as computer vision.

For example, a smart connected CT scanner can send data directly to an IoT cloud. Thanks to the new technologies provided by deep learning algorithms like neural networks, the system can interpret one medical image based on what it's learned from hundreds of thousands of others, and identify indicators of cancer that would otherwise remain undetected. The results are almost immediate, and are readily available for the doctor to use in diagnosing and treating patients.
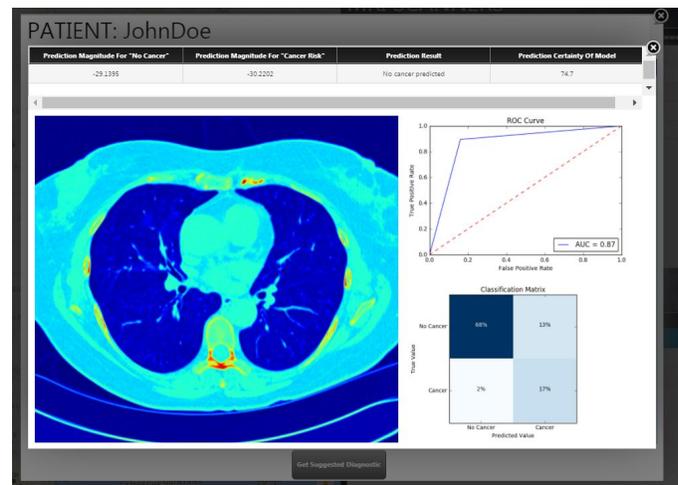
Improve Accuracy and Patient Outcomes with Scale

Deep learning and other machine learning techniques improve as more data is collected. This means the system's accuracy of detecting tumors could increase over time due to the ever-growing database of medical images being fed into the cloud by smart connected medical imaging devices.

A smart connected CT scanner has the potential to not only provide life-saving images for a single patient, but to continually provide quality data to support the analysis that could save others in different facilities and locations altogether.

PTC's ThingWorx Analytics platform can act as the hub for medical images and enable the medical device industry to harness the power of the Internet of Things, cloud computing and machine learning to improve the quality of diagnosis and treatment of cancer and other diseases.

This technology has not been validated or approved by the FDA or other international regulatory agencies as a saleable medical device. However, given the success of this capability, we believe smart connected medical devices like this present many opportunities to increase effectiveness and reduce costs.

Potential Business Model Innovation for Medical Device Manufacturers

Smart connected technologies like the one discussed in this article will also allow medical device manufacturers to innovate on their business models. Integrating smart cloud platforms to medical devices they bring to market and licensing cloud analytics capabilities to their customers as a premium service. Subscription based cloud analytics services for medical diagnosis has the potential to drastically improve radiology workflow by allowing for faster, more accurate cancer diagnosis.

From predictive maintenance and smart software updates to using advanced analytics on rich multimedia data, smart connected medical devices have the potential to fundamentally change the future of healthcare.

1. https://www.mdanderson.org/documents/about-md-anderson/about-us/facts-and-history/quick-facts.pdf

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Think Forward. Act Now.

If your business goals include reducing cost and increasing effectiveness, now is the time to take the next step towards smart, connected products. Reap the benefits of IoT analytics with rich multimedia data analysis — not just text or numbers — to improve patient outcomes. Replace downtimes and maintenance costs with predictive maintenance and automatic software updates to invest in the future.

Accelerate innovation results in a digital world. Think forward. Act now.

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What's your view? Add your question or comment

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