

Reducing job stress for radiologists

Rapidly analyzing medical images using intelligent data lakes on Google Cloud

Helping radiologists with cloud-based algorithms that aid in diagnosis.

About Quantiphi

Based in Marlborough, MA, [Quantiphi](#) is an award-winning Applied AI and data science software and services company driven by the desire to solve transformational problems at the heart of business. It was named Google Cloud's Global Social Impact Partner of the Year for 2019 and Machine Learning Partner of the Year for 2017 and 2018.

The job of a diagnostic radiologist can be stressful: imagine being alone in a dark room for much of the day, examining images and knowing that behind each one is a human being depending on you for a correct diagnosis. You must evaluate their health based on not much more than a single image—and one mistake could have catastrophic consequences.

Now imagine that there's a centralized system in place: an immense, intelligent data lake that houses millions of similar images and delivers a report and "confidence score" to you right in your office. Combining this powerful report and score with your own trained eye and medical expertise can help you make a diagnosis faster and more accurately than you could on your own.

The idea to create this centralized system came from one of the largest healthcare life sciences companies in the world, who engaged teams from Quantiphi and Google Cloud to make it so. Their vast amounts of medical data come from many geographical areas, originate from many

different sources, and include many types of data sets. "Managing different geographies on premises with a lot of overhead—it's a very expensive way of managing data, and that's one of the reasons that it made very good business sense to move to a cloud-based centralized solution," explains Ashish Bharti, Client Engagement Manager at Quantiphi. "The overarching aim here is to create a globally centralized data lake to store, curate, and of course manage, medical and healthcare data."



The challenge of varied formats, rigid source systems, and what people are used to

Centralizing the customer's data proved challenging, not only because of the variety of datasets and formats coming from different geographic areas, but also because no scalable solution existed. Quantiphi would have to create something new. Waled Tayib, Big Data Engineer at Quantiphi, notes that many hospital servers are "rigid source systems," which makes it "really hard to manipulate the data on the source and get it to the cloud." He adds, "We're also dealing with customers that are very used to using different DICOM viewers or different tools that may not necessarily be cloud-friendly."

The team created a new process to ingest and handle all the data, using an array of Google tools and services including Kubernetes, Cloud Scheduler, Cloud Functions and Compute Engine. A crucial aspect of the process is removing Protected Health Information from the data and as it turns out, Google Cloud has the perfect tool for the job. "One of the neat features and neat tools we've used during this project was the Healthcare API, specifically because it has very good capabilities with DICOM images," recalls Tayib. "There's a lot of software out there to help you de-identify text data, but there's not many out there that can do actual pixel data at scale and also at an accuracy that the Healthcare API does."

A custom DICOM viewer that handles widely varied image resolutions to pinpoint even very rare diseases

Let's say that during a typical day examining radiology images, you come across what could be a very rare pulmonary abnormality. With the innovative DICOM viewer that Quantiphi customized for your department, you can see the image annotated and labeled based on data incorporated from thousands of other pulmonary images.

These huge 3D images were originally of widely varied resolution, making them extremely hard to standardize for comparison. Moreover, the incidence of the disease you're checking for is so low that



Waled Tayib, Big Data Engineer, Quantiphi

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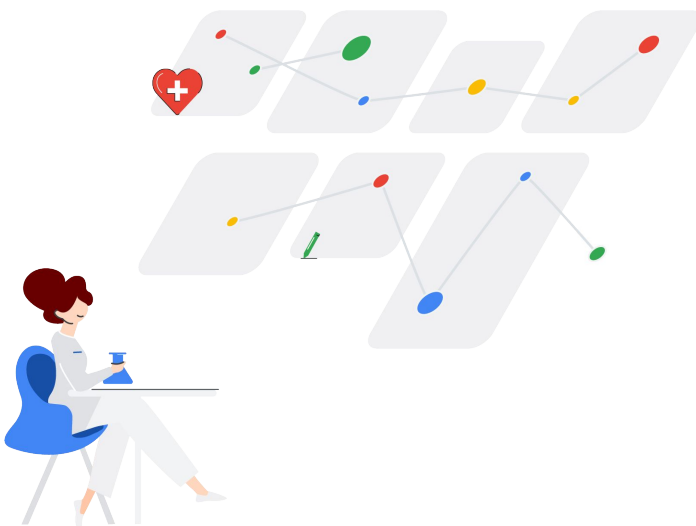
there are few positive examples, making it imperative that you check your image against a large database.

Quantiphi's pioneering solution processes raw images so they're immediately useful for your diagnosis. "You take a raw image or a CT scan, and then it passes through the algorithm pipeline," says Bharti. "Pre-processing includes making cubicle sizes that can pass through the models. It just breaks down the entire image." The smaller images are easier for the trained classification model to compare and analyze.

A one-stop shop to support the radiologist's everyday workflow

The custom DICOM viewer, and the entire process that delivers a labeled, annotated image along with its associated report and “confidence score,” is in no way a replacement for your human skills as a radiologist. It’s simply an invaluable form of assistance. “What we are trying to enable here is to help our radiologist make better decisions,” Bharti clarifies. “Our aim with this overall ecosystem is not to be a single source of truth in terms of diagnosis, but rather be a helping hand to make diagnosis faster, better, and probably cheaper.”

With this kind of help, both you, the busy radiologist, and your pulmonary patient can breathe a little easier.



Ashish Bharti,
Client Engagement
Manager, Quantiphi

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