Exploring Edge AI Use Cases

November 4, 2021

By Ishan Anand

Across the enterprise computing landscape, two technologies are certain to have a major impact in the coming years: artificial intelligence (AI) and edge computing. In a recent survey, 95% of C-suite executives said they believe their organizations would benefit from embedding AI into their daily operations. Similarly, research into edge computing shows that 54% of organizations currently use or plan to use an edge-computing architecture over the next 12 months. Another 30% intend to evaluate an edge architecture over the next 24 months.

Based on the strong, nearly universal interest in these technologies, it's certainly not much of a stretch to suggest that combining AI and edge computing will interest organizations. Moreover, this combination opens up a range of new and exciting application areas that otherwise wouldn't be possible. This blog will showcase two examples.

Largely, AI models and applications need to be hosted and trained in the cloud, which works well for in-depth analytics where the inherent latency involved with the cloud isn't an issue. But for applications requiring an AI-based system to perform actions in real time, the latency involved with moving data back and forth to a data center, which could be thousands of miles away, is a showstopper.

That's where edge intelligence enters the picture. By moving processing

closer to the source of data generation, edge intelligence addresses several limitations of centralized computing, such as latency, bandwidth and security, while still retaining all the advantages of the cloud, including scalability and resilience. The edge intelligence model also minimizes dependency on external network connectivity, an important consideration for mission-critical applications in remote locations like mines or oil rigs that regularly face connectivity challenges.

We've built the fully integrated Edge AI platform to help organizations efficiently adopt and deploy these technologies in meaningful ways. It's well suited for a broad range of application areas and use cases across manufacturing, retail, healthcare, media and entertainment, and much more. The possibilities are nearly endless.

With many organizations already pursuing edge computing initiatives, much of the infrastructure needed to deploy Edge AI applications is already in place or will be soon. We've designed Edge AI to be a real-time actionable data and machine learning (ML) insights platform with cloud-agnostic interconnect, meaning an organization can begin taking advantage of the platform today without needing deep data science and AI expertise. And, as the following two use cases illustrate, solutions based on Edge AI are easy to deploy, manage and operate.

AI-driven facial authorization

Even surveillance cameras and access control mechanisms such as identification cards, manufacturing plants, and other facilities struggle to act on this data in real time to prevent unauthorized users from accessing

restricted places in violation of policy. It’s far too easy for an unauthorized visitor or even an employee to gain access by “tailgating” (gaining unauthorized entry to a secured area by closely following someone with authority to enter) an authorized employee or by making an excuse for why they should be allowed into the facility.

Beyond external visitors, some manufacturing facilities have strict policies about which areas employees from other parts of the shop may access for security or quality control reasons, among others. For security personnel monitoring the facility, it can be challenging to know with certainty which employees are authorized to be in which locations. This situation where there simply isn’t a good solution, which also requires constant vigilance, is ideally suited to a facial recognition solution based on the Edge AI platform.

Implementing a facial recognition system is a relatively straightforward process. It begins by setting up a network of IP-based cameras around the facility. For restricted areas within a shop floor, for instance, the cameras are configured with a soft limit on how far the camera can see. When anyone is outside that soft limit, the camera will disregard them. The system detects anyone entering a protected zone and determines in real time if the person is or is not authorized to be there. This allows a large physical workspace to be divided into multiple logical work zones and accurately monitored.

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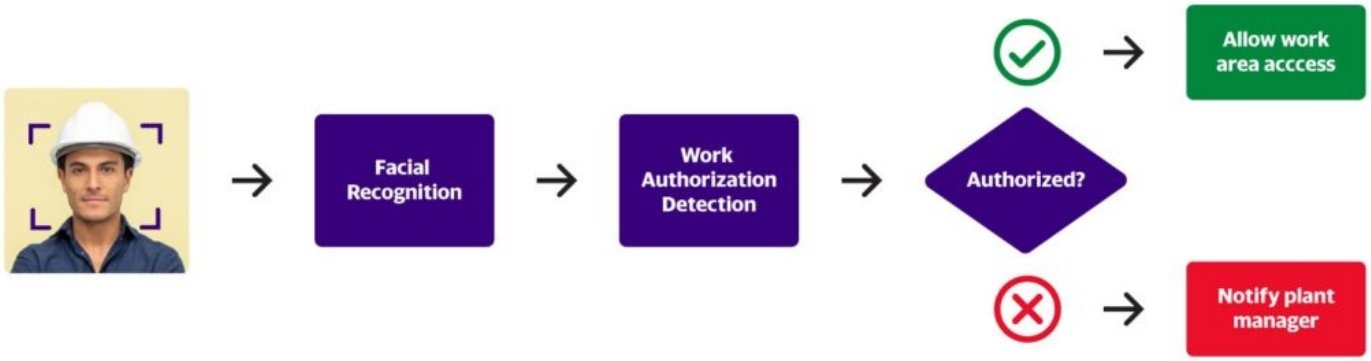


Managing and operating the facial recognition system doesn’t require special skills or extensive training that could impede adoption. Employee faces and photographs are typically in HR systems and can be easily imported into the facial recognition system along with access rules and policies. Temporary authorizations are handled as part of standard security protocols, and devices can be managed and relocated or replaced as needed directly within the system.

Compared to cloud-only alternatives, an edge-based solution protects organizations from the potential liability and legal challenges associated with sending personal information, such as people’s faces to the cloud without their permission. Configuring the system to ensure that all the data captured doesn’t go anywhere outside a campus avoids such challenges.

Another advantage of edge-based facial recognition is real-time inference. The system can respond instantly when an unauthorized user is detected. This doesn’t happen in near real time but in real time with only a few milliseconds latency. Any intruder is detected immediately, and an alert is sent without any delay to security personnel via a Multimedia Messaging Service (MMS) with a headshot of the unauthorized user, allowing the security team to take appropriate actions.

To summarize, the advantages of a facial recognition system based on an edge computing model include:

- Accurate monitoring of large shop floors with multiple protected areas
- Easy device management and configuration
- Smart protection from potential legal liability due to sending facial information to the cloud
- True real-time alerts if an unauthorized visitor is detected

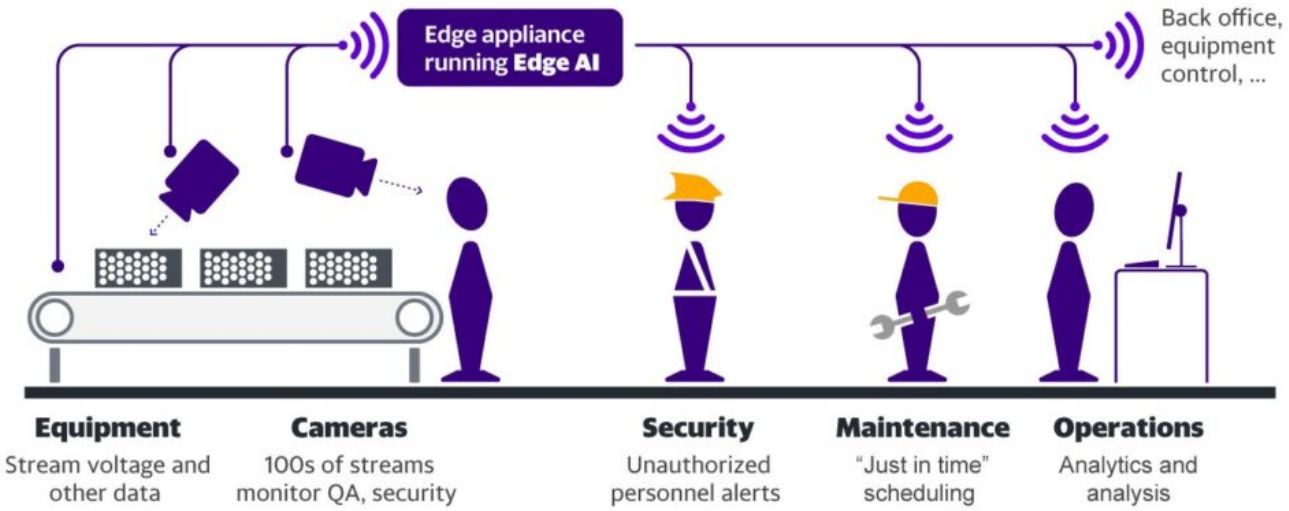
Optical inspection meets the edge

Another use case well-suited to Edge AI is the automated optical inspection of various parts and assemblies throughout the manufacturing process. Traditional vision systems have long been used for quality control inspection and validation to fabricate everything from electronics systems to pharmaceuticals.

While traditional vision systems can accurately identify defects and other QA problems, they rely on rulesets rather than machine learning and AI to inspect parts and assemblies. This limits them to specific use cases and components and limits the ability to scale solutions across various product types. Third-party technicians must reprogram them to accommodate new models or products, and cameras and robotic arms must be accurately repositioned to minimize variability. And without cloud integration or data

capture capability, traditional systems cannot capture data to optimize processes. All this significantly increases costs and decreases the ability of manufacturers to respond to changing market demands in a timely way.

A system based on Edge AI overcomes these challenges and offers the potential to transform automated optical inspection as we know it today. Using modern AI and ML-based solutions, manufacturers can quickly and easily set up new inspection profiles across an entire product range and implement modifications and refinements on the fly.



With an intuitive web-based user interface, an intelligent optical inspection system allows IT or manufacturing team members to import and acquire the images needed for inspection and initiate training routines with a single click.

Further, as the AI gathers data, the quality of the inspections improves so it can tolerate changes in lighting or field of view due to camera movement or

location changes. This adaptability also helps when it comes time to set up inspection cameras; the camera placement lens type determines the field of view and can be adjusted to accommodate various product dimensions.

An AI-based system can inspect assembled parts like a human and understands acceptable deviations at a much faster pace with greater consistency. Just as a neural network can differentiate between a cat and a dog, an AI-based system can perceive whether a particular object is acceptable or has missing components or some physical damage. With built-in optical character recognition (OCR), the AI can also scan for barcodes or serial numbers.

AI and ML systems require considerable processing power and storage, particularly for training the models. That’s why such systems are typically hosted in a cloud environment. As with many other similar cloud-based applications, the challenge is the latency involved with sending images and data back and forth to the cloud – the end application is just too slow to be of much value in a fast-paced manufacturing environment. And the large amounts of data streaming from cameras significantly increase cloud storage and bandwidth requirements.

Alternatively, with an Edge AI application, processing and inference happen in real time on the edge using trained models pulled from the cloud, and most of the streaming content is stored locally. These edge functions are fully integrated with the cloud, which is used for workloads well-suited to it, such as CPU-intensive model training and lifecycle management. Whenever new inspection profiles are created, the images associated with the profile

are automatically uploaded to the cloud, and the model is then trained in the cloud with those images. Once the training is complete, the trained models automatically deploy to the edge to begin the inspection. Multiple trained models can be used in a single inspection profile.

To summarize, the advantages of an automated optical inspection solution based on the Edge AI platform include:

- Easy-to-use web-based interface for setting up new inspection profiles – no data science or AI expertise needed
- Fast model training in the cloud provides the flexibility to change parts or processes without losing time or sacrificing quality
- Quick accommodation to changes in lighting or camera angles
- Rapid Inspection of fully assembled parts for missing components or damage
- Vast data capture for further analysis and to enable process enhancements and refinement

As these use cases demonstrate, the combination of the two hottest trends in enterprise computing today opens up a range of new applications that require both the processing and storage horsepower of the cloud along with millisecond response times.

Contact us to learn how your application could benefit from our Edge AI intelligence platform.

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