Vision-Based Inventory Management Solution

TEMPO

When the first Android phone was released, the New York Times did not know what to call it.

"The Google phone is real, and it's finally here," an article at the time read, as it explained the difference between a phone's software, hardware, and maker. The confusion made sense for the time: smartphones, as a word, did not enter the lexicon until about 2010, according to Google Trends.

As new technology emerges, struggling with words is a common story. Our very own computer vision technology is grossly dubbed vision-based inventory management system (VIMS) in an attempt to do sufficient justice to the immense capabilities of this technology.

Computer vision is behind the artificial intelligence "renaissance" supply chains are living today. It's so widespread and has so many use cases, one term ("Android") may not be enough to capture the whole technology.

"Make your vision so clear that your fears become irrelevant." – Anonymous

Nevermore true in manufacturing! Companies are increasingly using vision systems in manufacturing to identify quality issues in supplier parts, to perform in-line quality checks post-assembly, and to prevent quality issues in applications such as robotic path guidance for dispensing.

Applications for machine vision have been quite diverse, ranging from spotting defects in leather for footwear manufacturing to checking component presence and mounting quality on electronic circuit boards.

So, what is driving this recent growth spurt? The three biggest drivers have been:

1. Decreasing cost of robotics/automation
2. Increasing labour cost
3. Increasing computational speed

These factors create a perfect, incubatory environment for machine vision technology to flourish.

Advances in Artificial Intelligence (AI) have also given a steroidal boost to the adoption of machine vision. This is because AI algorithms learn just like humans do, and can train their machine-vision eyes on several thousand parts a day, without taking a break or suffering from tired eyes at the end of a 12-hour shift. Given that most plants and warehouses run two shifts a day, the ROI has been healthy with paybacks typically landing within one to two years of implementation.

With the size of the vision system market at $8 billion and growing at a double-digit compound annual growth rate, it is clear to see – more machines are watching, and they're doing it well!

Computer vision has broad potential in the supply chain.

Teaching machines how to "see" the world has so many potential applications; it's hard to definitely say where the biggest benefits are (even when narrowed down to the supply chain).

A few specific areas that are especially promising include:

- **Video and image analysis** — this can be used in a number of ways such as analyzing images for trends to match or make recommendations for fashion, using it for security and biometrics such as facial recognition.

- **In combination with unmanned aerial vehicles (drones)** — This is ideal for situations where the task is dangerous, difficult, or otherwise inaccessible by humans. This can include tasks such as tracking assets in the field (think vehicles and inventory at vast construction sites), mapping (such as creating a representation of the terrain for navigation and other purposes) and site surveys (such as flyovers to get an updated view of locations for development, or overview of the progress).

Another example is within retail and the consumer packaged goods space.

Computer vision can be used in the unified commerce experience in a number of ways. It can track the customer's journey to the point of sale, create more advanced heat maps to understand where customers are and manage to staff accordingly, optimize space based on customer interest, and evaluate customer responses to products based on emotion detection.

In addition, companies can:

- **Add computer vision (CV) to robots** — This can assist with navigation as well as other tasks such as quality control (the latter, is known as machine vision, a subset of CV and has been around for quite some time, but recent technological advancements are democratizing the solution).

- **Use it for planogram compliance** — This can either be automated like on a robot, or a fixed camera, but can also be used to augment a worker's ability in checking planogram compliance by improving effectiveness and speed while decreasing errors. The CV algorithm identifies things like product positioning, facing, shelf availability, out of stock, and pricing.

- **Use it in warehousing and logistics** — tied to the robotics example above, a vision-enabled robot can navigate a warehouse and do various tasks like pick-pack lists, especially when there are high insurance type situations (where human worker safety is an issue/concern).

The business case for imaging technology and computer-based vision in the supply chain, particularly when linked to AI, can be made in three distinct areas:

1. Where you need to keep a constant "eye" on a process;
2. Where you'd like to reduce the cycle time by orders of magnitude; and
3. Catching where error or damage might have taken place in a logistics process, and quickly rectify it.

Computer-based vision will help reduce bottlenecks, which typically happen when manual processes kick in, and it will help reduce or eliminate human error, and it will speed up processes.

Let's take constant watchfulness to start. A machine breaking down at a beverage manufacturer that's using an automated manufacturing process could create a massive bottleneck or disruption in the supply chain, rendering the manufacturer dead in the water as a result. Deploying computer-enabled vision and imaging technology to observe the machine, and let's say it has enhanced infra-red capabilities, can provide the manufacturer with a constant "set of eyes" watching over the equipment, monitoring its performance, and anticipating potential failures.

It's a different story if a human being is trying to do this same job. He or she is subject to fatigue, limited powers of observation, distraction or simply the need to be doing something that's perceived as a higher-value task. With machine vision, it becomes possible to keep a constant watch.

A second area where imaging technology could be deployed is in logistics, where goods are being moved from one place to the next, over several legs of a journey, and could be subject to damage anywhere along the line. At each stage, computer-based vision can help check on the state of the goods and send word back. If an item gets damaged, an early replacement can speedily go out, and better still, we know where the damage happened along the way.

In a third example, one which vastly reduces cycle time, I'll stretch the definition of the supply chain. When your property has been damaged, for example by a storm, in the old model, your insurance company would send out an adjuster to view the damage, photograph it, and send details back to the claims processor. Based on the damage, the claims adjustor will come up with a dollar value for the payment, a check gets cut and mailed. Many insurers are now sending drones with computer-aided vision. These drones photograph the damage, the photos are uploaded to the cloud which digitally sends the claim to the back office from where payment to the customer goes out. From the computer-based vision on, the entire claims process can be automated.

In each of these cases, humans can be redeployed in higher-value tasks, providing a strong business case for the technology's use in the supply chain.

HOW iS COMPUTER ViSiON TECHNOLOGY USED iN THE WAREHOUSES?

Understanding the role of the warehouse is vital before diving into the concept. Storing numerous goods and releasing them when they're required creates a time utility, and that would be the major role of the warehouse. We can implement computer vision technology in the warehouse to count, inspect, and track inventory, leading to better accountability. Computer vision technology can enable operators to be more efficient and accurate. As long as we train, technology can do wonders.

Here are three important cases that several warehouse industries focus on making an essential part; they include:

Quality control:
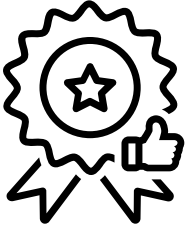
The cycle holds overall responsibilities, such as storing, managing, and keeping track of the products until they've been dispatched. Excellent quality control helps companies meet consumer demands for better products. Identifying quality defects is often crucial to prevent disappointment, and manual detection methods cannot easily achieve it. In this case, computer vision technology permits identifying the unknown objects in under a second.

Safety and security:

In a current trend, robots are automatically utilized in warehouse and manufacturing environments to automatically recognize and respond to the human position and motions automatically. The fundamental use of these technologies is to cooperate with humans and warn them of a doubtful activity before the injuries occur. Then again, computer vision technologies are utilized in the warehouses to recognize various products, which are avoided about putting or situated mistakenly, etc. These technologies are also used for surveillance, such as the face, fingerprint, and retina recognition.
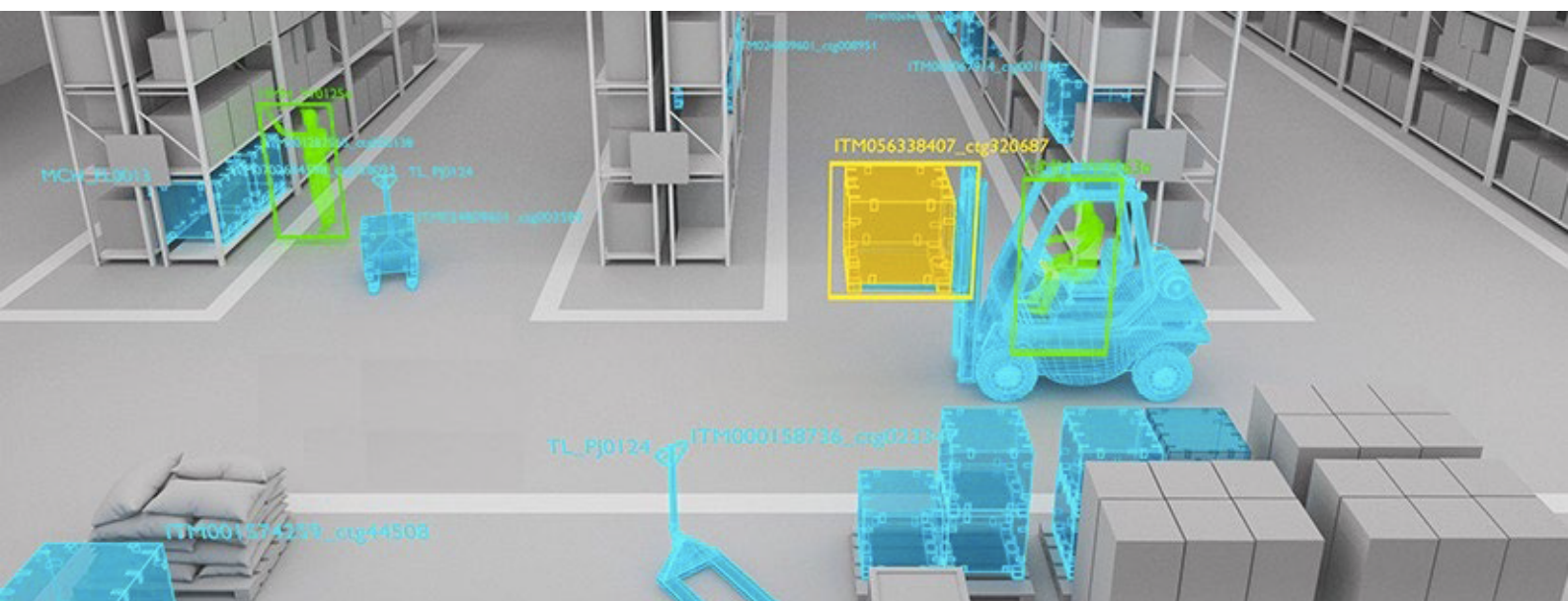
Value cases for vision-based inventory management solution in a warehouse environment

Computer vision has become the most popular and favoured automation over the recent decade, notably in the warehouse industry. Computer vision technology has several applications in all the streams, and each one of them plays a significant role in the development of the e-commerce industry.

Below are some top business cases for computer vision in the warehouse:

Defect inspection:
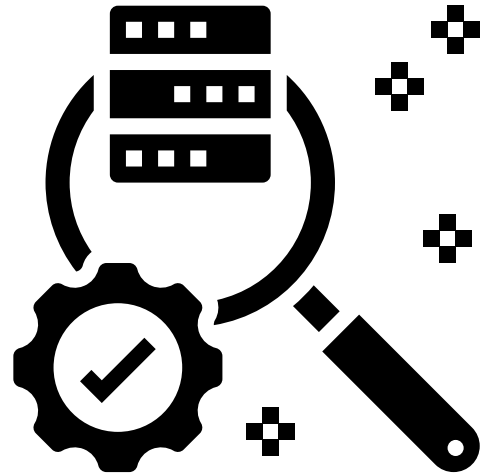
Inspecting is one of the primary necessities to eliminate defective parts, products, or a component. The manual inspection always requires more time, and the person who inspects should undergo proper training for a period to choose the defective item in an instant.

But these manual processes can cause bottlenecks during the shipment timelines, and that later turns cumbersome. An automated optical inspection can be an excellent replacement for manual review. These systems are equipped with a multi-camera with various resolutions based on the clients' requirements.

The following benefits of defect inspection include:

- Efficiently identifies the defective item in less than a second.
- Has a higher inspection speed than the manual speed.
- Improves productivity.
- Reduces manual errors.
- Can be able to work throughout the day.
- Can be programmed and monitored remotely.

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Automated dimensioning systems

Dimensioning and weighing are effective ways to save space and money. Concentrating on that, the automated dimensioning systems are much more convenient in measuring the length, breadth, width, and weight of the products in less than a second. These dimensioners are further embedded with other prominent features such as bar code scanning systems, label printers, and tracking systems.

Here are the four powerful reasons why major warehouses need automated dimensioning systems:
- Increasing speed
- Throughput optimization
- Improved accuracy of shipping cost
- Future capacity planning

Below are some noteworthy points that articulate how the automated dimensioners boost warehouse efficiency:

Assists in raising profitability:

The dimensioners are more valuable in determining the exact dimensions that help allocate the required space—this process further reduces unnecessary shipping expense pitfalls and enhances a market profit.

Speedup freight dimensioning and weighing operations:

With automated dimensioning solutions, warehouses can permanently reduce the measuring time to nearly less than a second! By doing so, the throughput of your facility goes up, which leads to increased revenue generation.
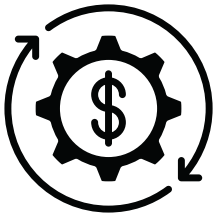
Optimize warehouse with cubing data:

Logistics management and planning software tools can help lift the warehouse's efficiency and the shipment of goods. To fully benefit from this advancement, an accurate dimensioning system is required so that the weighing data can be used to make the right decision at the right time. It also prevents the influx of inaccurate dimensional data that can result in errors during the arranging stage.

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TEMPO's automation solutions are designed to mimic human interactions and perform manual routine business processes that are high volume, repetitive, time-critical, rules-driven, and prone to human error. By leveraging existing infrastructure, Robotic Process Automation can be implemented and integrated across multiple platforms, without causing disruption to underlying systems.

TEMPO's proprietary technology integrates into your existing system and provides real-time inventory data on the floor. Our vision-based inventory management system helps you spot lost inventory, eliminate counting errors, optimize level space, reduce categorisation errors and reduce system and floor discrepancy. Complete digital transformation at minimal upfront cost.

VIMS is a cloud-based software which works on a centralized system that will not only increase warehouse efficiency but also offers efficient inventory management, better tracing and tracking, cost reductions, and faster flow of information.

VIMS continuously matches floor and system data providing you with a clear picture of your entire warehouse. Your staff now does not need to waste time looking for lost stocks, performing counts and walking the endless pathways to manage inventory.

VIMS makes sure your data is accurate to provide an accurate forecast and demand analysis. With a clear vision across your warehouse, order fulfilment is now a breeze with efficient lead times and minimal staff errors.

VIMS lets you reduce cost by optimizing inventory layout and performing the right picking strategy according to your type of inventory. These can reduce walking times, utilize space properly, and streamline operations.

VIMS is Big Data Done Right!