Using AI to Help Sort Potatoes

How to be 25% more efficient in quality control by implementing artificial intelligence

Submitted by Dominique Jobin, business development manager, Vooban

Patates Dolbec is the largest potato producer in eastern Canada. The company cultivates nearly 10,000 acres of land in the Portneuf region and has vertically integrated itself over the years.

The Saint-Ulbade company markets to retailers such as Costco, Metro, and Sobeys, as well as distributors like Cage aux Sports, for example.

Today, Patates Dolbec cultivates, transforms and packages a wide variety of potatoes destined for the North American market.

Patates Dolbec had a problem with potato sorting in its factories, which required extensive manpower.

Potatoes can exhibit many types of imperfections, with some becoming green because of sun exposure in the field, or others exhibiting black spot, which is caused by fungi, and more.

In all, Patates Dolbec identified 25 types of defects to consider, as well as size, with some customers wanting small potatoes and others preferring medium or large spuds.

Through the labor-intensive task of manually sorting potatoes, workers were accidentally removing healthy potatoes or missing those that had defects.

ARTIFICIAL INTELLIGENCE

In automating the task with optical sorting machines and cameras, Patates Dolbec initially achieved a 70 percent efficiency rate, which meant that the remaining 30% of potatoes were not sorted correctly.

Above: Patates Dolbec was not satisfied with the performance (30% error rate) of its legacy potato optical sorting machine, which required laborers to manually remove the remaining defective potatoes and avoid losing good potatoes and the profits associated with them.

Having always relied on innovation to improve performance, Potatoes Dolbec sought the help of Vooban, a Quebec-based company, to streamline its quality assurance process using artificial intelligence.

Vooban not only specializes in the application of artificial intelligence (AI), but also helps companies navigate the Cloud and Internet of Things (IoT), as well as performing Web and mobile device development.

The challenge was to significantly improve Patates Dolbec's existing equipment with the help of AI, among other technologies, without completely changing the machines.

One change was to the preexisting system of cameras, which was older or more traditional, replacing them with newer, more effective models.

Vooban also developed a deep learning algorithm with a whole new dataset made from thousands of pictures of potatoes taken by the cameras.

Commands were created according to the algorithm's results to effectively sort the potatoes.

DETECTING IMPERFECTIONS

Patates Dolbec's objective was to enlist Vooban to help detect all types of imperfections affecting the potatoes' quality and to provide a solution that would allow freedom in choosing the quality level of product according to the varying needs of customers (restaurants, grocery stores, etc.).

An additional challenge was to surpass the performance and detection algorithm of its industrial sorting machine, which is the market benchmark for this sort of task.

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– Hugues Foltz,
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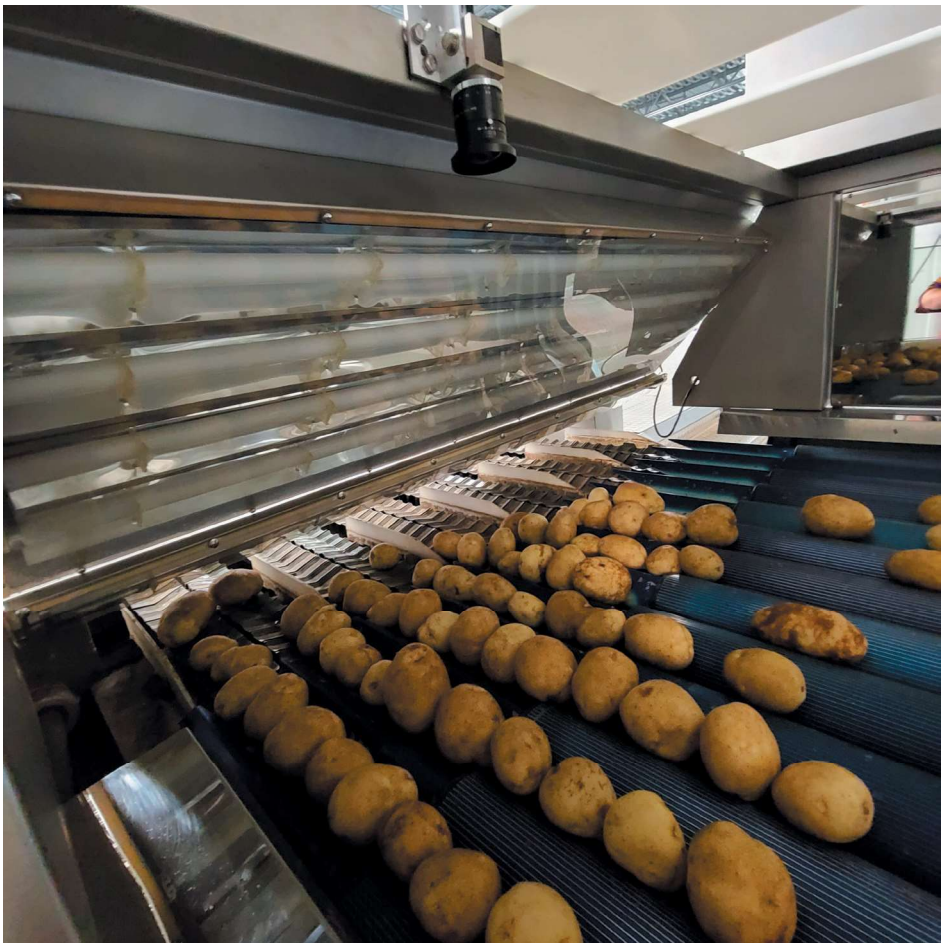
potatoes and the profits associated with them.

In an industry with chronic labor shortage, a better solution was crucial.

The company did eventually reach a 95% efficiency rate by retrofitting its optical sorting machine with high-definition cameras and a state-of-the-art, deep-neural-network model to leverage recent developments in AI and computer vision.

To allow for periodic retraining of the model, a machine learning pipeline was developed in the AWS (Amazon Web Services) Cloud.

From datastore, labeling, and training to model registry and edge deployment, the AWS Cloud is the foundational backbone of the upgraded sorting machine.



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25% GAIN IN EFFICIENCY

In the end, the implementation of AI in the quality control process had allowed Patates Dolbec to gain no less than 25% in efficiency, as the error rate went from 30% to 5% in just a few months.

"Simply with the implementation of artificial intelligence, we managed to avoid the loss of at least 15% of healthy potatoes that would have been thrown out otherwise," says Hugues Foltz, executive vice president of Vooban. "That amounts to roughly 500,000 pounds of potatoes a year."

"Not only did AI help a local company optimize its processes," he adds, "but it also helped counter food waste."

Patates Dolbec, with the help of the AWS Cloud, is now fully autonomous in its capacity to retrain and deploy new models developed using knowledge from the company's own workforce.

This allows Patates Dolbec to adapt the model to new varieties or changes in the base product.

Furthermore, the company can customize the behavior of the sorting to a level unattainable by its legacy machine.

Patates Dolbec can now precisely tune the sorting characteristic to address the needs of different customers. BC'T