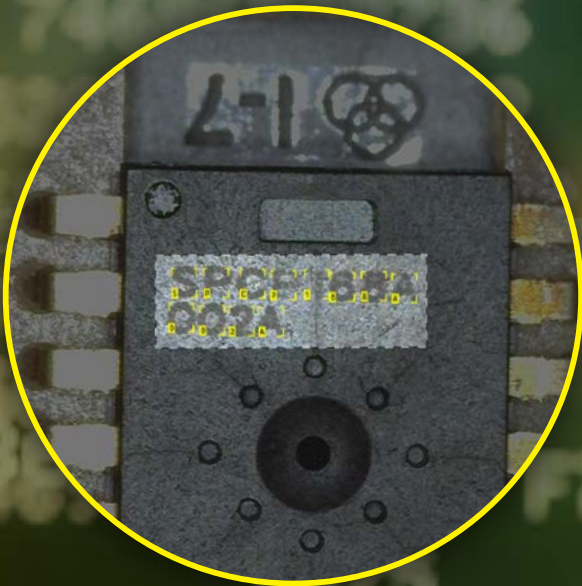




Diagram illustrating a 1D CNN architecture. The input layer consists of 6 units. The first hidden layer has 1 unit. The second hidden layer has 6 units. The output layer has 4 units.



Optical Character Recognition

COGNEX

THE GLOBAL LEADER

IN MACHINE VISION AND INDUSTRIAL BARCODE READING

Cognex®, the leading supplier of machine vision and industrial barcode reading solutions.

With over 2.3 million systems installed in facilities around the world and over thirty nine years of experience, Cognex is focused on industrial machine vision and image-based barcode reading technology. Deployed by the world's top manufacturers, suppliers and machine builders, Cognex products ensure that manufactured items meet the stringent quality requirements of each industry.

Cognex solutions help customers improve manufacturing quality and performance by eliminating defects, verifying assembly and tracking information at every stage of the production process. Smarter automation using Cognex vision and barcode reading systems means fewer production errors, which equates to lower manufacturing costs and higher customer satisfaction. With the widest range of solutions and largest network of global vision experts, Cognex is the best choice to help you **Build Your Vision.™**

\$726
MILLION
2019 REVENUE

OVER 39
YEARS IN THE BUSINESS

500+
CHANNEL PARTNERS

GLOBAL OFFICES IN
20+ COUNTRIES

2,300,000+
SYSTEMS SHIPPED



COGNEX DEEP LEARNING SOLUTIONS FOR OPTICAL CHARACTER RECOGNITION

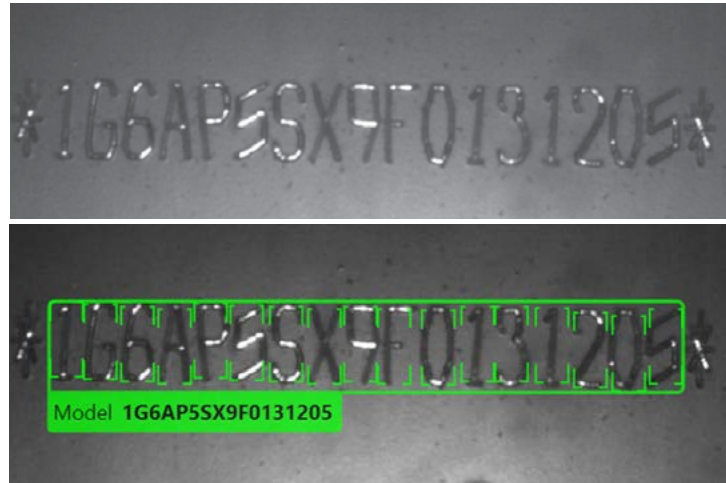
Today's machine vision algorithms can distinguish parts by even the subtlest of differences in markings or features. And yet, limitations exist. Optical character recognition (OCR) performs well with traditional rule-based machine vision under ideal, repeatable conditions when the font is legible and presented on a contrasting background. Deep learning technology however, offers a breakthrough method to automate this class of inspection when codes are badly deformed, skewed, or poorly etched, particularly under difficult-to-read conditions. Cognex's deep learning-based OCR tool leverages a pretrained font library for inspections. Simply define the region of interest, set the character size, and label the characters in the image set. Deep learning-based OCR is able to read codes that traditional OCR tools are not able to decode.

VIN Code Reading.....4

Electronic Chip OCR Code Reading.....5

**OCR Code Reading
on Cylindrical Surfaces.....6**

Plastic Pouches OCR Code Reading.....7



AUTOMOTIVE VIN CODE READING

Ensure all vehicle identification number codes are read under any condition for traceability

Challenge

A vehicle identification number, or VIN code, is a multi-character code used as a unique identifier for automobiles. VIN codes contain letters and numbers and may be a direct part marked (DPM); etched or scribed onto a metal plate; or printed on a sticker. Automotive manufacturers must be able to locate and decode VIN codes for successful traceability. Specular light, paint colors, and glare make it difficult for a machine vision system to locate and recognize characters. An inspection system needs to tolerate reflective surfaces which challenge image formation in order to successfully decode characters.

Solution

With Cognex Deep Learning, it is now easy to locate and read deformed characters, despite image formation challenges. To train the software, an engineer defines the region of interest on images which contain a representative set of VIN code characters. The software's pre-trained omni-font capabilities recognize characters even if they are obscured by glare and contrast. During training and validation, a technician re-labels only the missed characters until the software's model correctly identifies all characters. This new deep learning-based approach to OCR saves time during training and development by reducing excessive labeling and successfully reads characters on very noisy backgrounds.



ELECTRONICS

ELECTRONIC CHIP OCR CODE READING

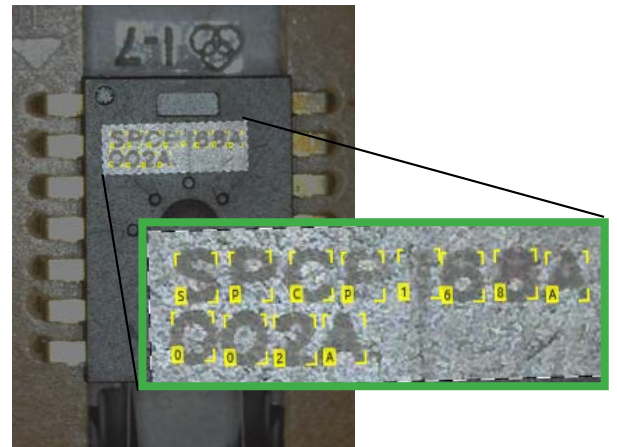
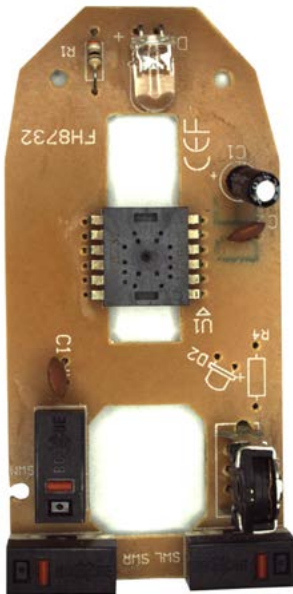
Read small, deformed, poorly-etched codes electronic chips

Challenge

Most chips are labeled with a string of alphanumeric characters to track them through production. Specular glare can result in low-contrast images, which make it difficult for a machine vision system to locate and recognize characters. To successfully decode characters on electronic components and modules, an optical character recognition (OCR) system needs to tolerate reflective surfaces as well as deformed, skewed, and poorly etched characters.

Solution

With Cognex Deep Learning, it is easy to read deformed characters, despite image formation challenges. This deep learning-based approach to OCR saves time during training and development by reducing excessive labeling, and successfully reads characters in challenging situations. The software simply requires an engineer to set a region of interest and character size. Once set, the tool's pretrained font library deciphers characters and reads strings without training. In situations where characters are very difficult to read, the software can be retrained directly using characters with variations.



FOOD AND BEVERAGE

OCR CODE READING ON CYLINDRICAL SURFACES

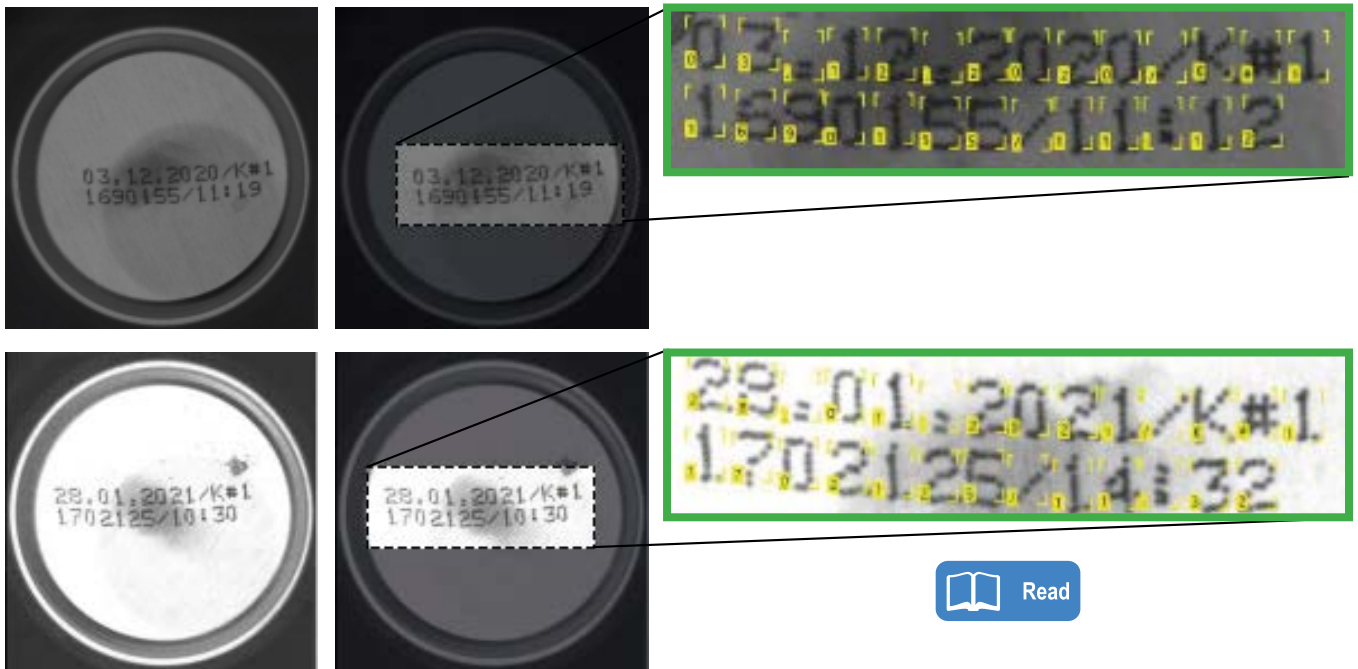
Decipher codes on curved, reflective aluminum cans under poor lighting conditions

Challenge

Aluminum cans on the packaging line cause a large variation of both luminance and reflection due to the shiny texture of the can's material. Plus, a curved form of the can and the non-precise inkjet-printed code, leading to burr, smudges, and characters being close to each other, renders inspection conditions that make it nearly impossible to use traditional OCR tools.

Solution

With Cognex Deep Learning, it is easy to read deformed characters under variable lighting conditions and from different angles. This new deep learning-based approach to OCR thrives under image formation challenges thanks to rapid training from small data sets using characters with variations. The software simply requires an engineer to set a region of interest and character size. Once set, the tool's pretrained font library deciphers characters and reads strings. The application can adjust with additional image training to account for variable lighting or codes read from unexpected angles.



PACKAGING

OCR CODE READING ON PLASTIC POUCHES

Read codes despite wrinkled surfaces, reflection, or badly formed characters on plastic pouches or other flexible packaging

Challenge

Hospitals need to read and verify characters printed on supplies like IV bags through an automated process for traceability purposes. When there is no standard font used in alphanumeric codes, this can require extensive training to teach the vision system to recognize the multiple fonts and styles it may encounter, especially on wrinkled surfaces like IV bags. Characters that are printed poorly, either on labels or directly onto packaging, can also cause optical character recognition (OCR) challenges. Large variation of characters as well as reflection and flexibility of plastic pouches does not permit the use of traditional OCR approaches.

Solution

Cognex Deep Learning deciphers badly deformed, skewed, and poorly etched characters using optical character recognition (OCR) and verification (OCV). The pretrained, omni-font library identifies most text out-of-the-box, without additional programming or font training. This makes for fast, easy implementation with limited development. This software can be retrained to adjust to specific OCR application requirements or misread characters.



COGNEX DEEP LEARNING SOLUTIONS

Cognex Deep Learning is the first set of deep learning-based vision solutions designed specifically for factory automation. The field-tested, optimized and proven technology is based on state-of-the-art machine learning algorithms.

Rather than following a rule-based approach to solving inspection challenges, like traditional machine vision applications, Cognex's deep learning solutions learn to spot patterns and anomalies from reference image examples. Deep learning automates and scales complex inspection applications that until now still required human inspectors such as defect detection and final assembly verification.



In-Sight ViDi

In-Sight® ViDi™ deep learning applications are deployed on the In-Sight D900 smart camera without the need for a PC, making deep learning technology accessible to non-programmers. It uses the familiar and easy-to-use In-Sight software platform which simplifies application development and factory integration.

VisionPro ViDi

VisionPro® ViDi deep learning software combines a comprehensive machine vision tool library with advanced deep learning tools inside a common development and deployment framework. It simplifies the development of highly variable vision applications and allows engineers to build flexible, highly customized deep learning solutions tailored to their specific needs.



COGNEX

Companies around the world rely on Cognex vision and barcode reading solutions to optimize quality, drive down costs and control traceability.

Corporate Headquarters One Vision Drive Natick, MA 01760 USA

Regional Sales Offices

Americas

North America +1 844-999-2469
Brazil +55 (11) 2626 7301
Mexico +01 800 733 4116

Europe

Austria +49 721 958 8052
Belgium +32 289 370 75
France +33 1 7654 9318
Germany +49 721 958 8052

Hungary +36 800 80291
Ireland +44 121 29 65 163
Italy +39 02 3057 8196
Netherlands +31 207 941 398
Poland +48 717 121 086
Spain +34 93 299 28 14
Sweden +46 21 14 55 88
Switzerland +41 445 788 877
Turkey +90 216 900 1696
United Kingdom +44 121 29 65 163

Asia

China +86 21 6208 1133
India +9120 4014 7840
Japan +81 3 5977 5400
Korea +82 2 530 9047
Malaysia +6019 916 5532
Singapore +65 632 55 700
Taiwan +886 3 578 0060
Thailand +66 88 7978924
Vietnam +84 2444 583358

© Copyright 2020, Cognex Corporation.
All information in this document is subject to change without notice. All Rights Reserved. Cognex, In-Sight, and VisionPro are registered trademarks of Cognex Corporation. Build Your Vision and ViDi are trademarks of Cognex Corporation. All other trademarks are property of their respective owners.
Lit. No. DLOC-03-2020

www.cognex.com