

Image Processing OCR Tool

This series of technical documents allows you to efficiently learn image processing starting from the basics. The topic covered in this section is the OCR (Optical Character Recognition) Tool.

Regardless of the industry type, a variety of text information including date codes and lot numbers need to be checked with image processing systems on the production line.

This section explains the principle of print inspection and the functions that are included in the OCR Tool that will optimise the inspection.

1. Classification of print inspection & typical application examples

Classification of print inspection

Print inspection can be classified on the basis of its purpose into the categories below. The inspection method and function to be used may vary depending on the application.

- **Presence/Absence of print** Detects a workpiece which lacks print due to inadequate adjustment or failure of the marking device.
- **Print quality** Detects an illegible character resulting from inadequate adjustment or failure of the marking device.
- **Character verification (OCV)** Confirms if the detected characters correctly match to the preset data set in the tool.
- **Character recognition (OCR)** Reads printed characters and outputs the information for sorting, verification, or automatic control.

* OCV: Optical Character Verification, OCR: Optical Character Recognition

Typical application examples

Date code inspection

Checking whether the best-before date on food containers is printed correctly (OCV).



Recognition of product numbers

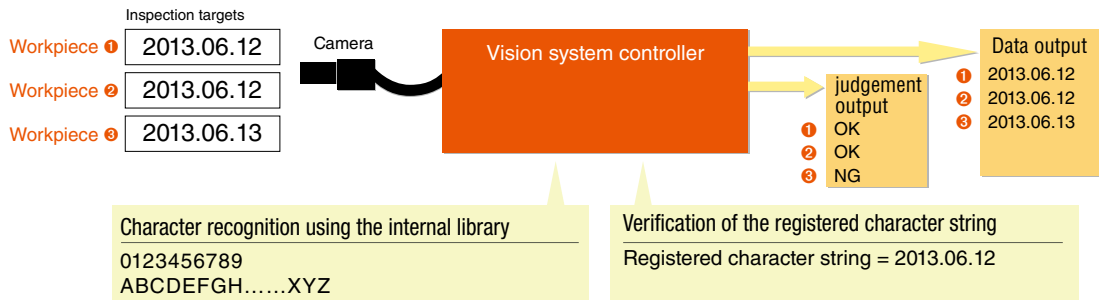
Recognising and reading the part number on electronic components with the vision system (OCR).



2. OCR Algorithm

Character recognition

As shown below, a vision system captures the image of the characters printed on a target with a camera, and then compares them one by one against the characters registered in the internal library (character dictionary). When the shape of a character matches closely with the shape of a character in the library, it is recognised as that character. As a judgement tolerance, the system can evaluate whether all the recognised characters match with the registered string and then output either an OK or a NG result. It is also possible to output the recognised characters to an external device as a data string.



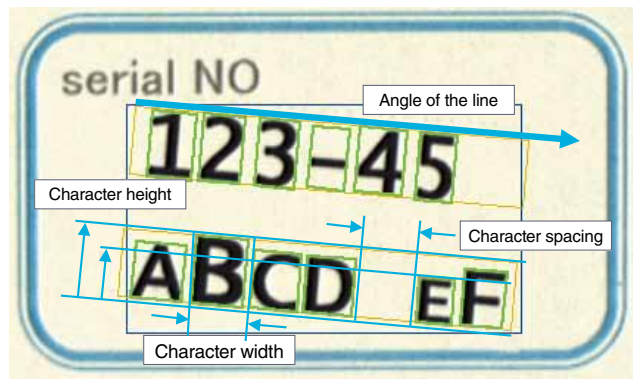
Auto character extraction setting

- In one inspection region, up to 2 lines of text with max. 20 characters per line can be extracted.
- The character strings can be located based on the unique projected waveform, and the extraction area is automatically adjusted.
- The character strings are extracted directly from the grey image, which eliminates the necessity for binarisation and minimises the impact from changes in brightness.

When the characters are automatically extracted from the measurement area, the following attributes can be also detected:

- Angle, rotation, and tilt of the line
- Variation in character height
- Variation in character spacing
- Variation in character size

These are all auto-corrected to improve recognition level of characters when compared with the library data.

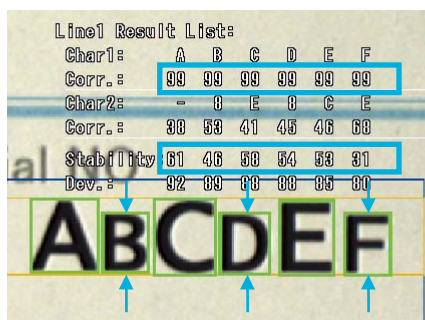


Fine Adjustment function

This function provides fine adjustment to respective characters that are extracted in a single uniform manner so that each of them will be placed under the optimal conditions for correlation.

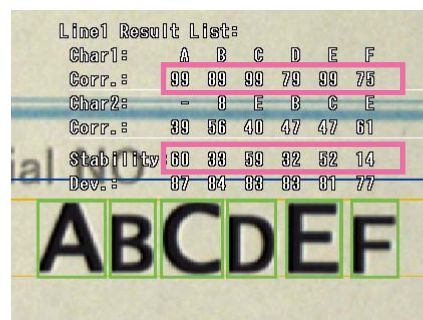
The subtle variations in each character are individually corrected for better correlation, which improves recognition level of characters.

Fine Adjustment ON (Default setting)



The size of each extraction area is finely adjusted according to the character height. This keeps the recognition level stable.

Fine Adjustment OFF



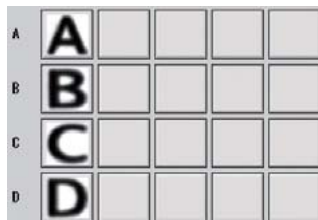
The recognition level decreases when the character height changes because the extraction area heights are kept same for all characters.

3. Standard OCR functions useful for applications

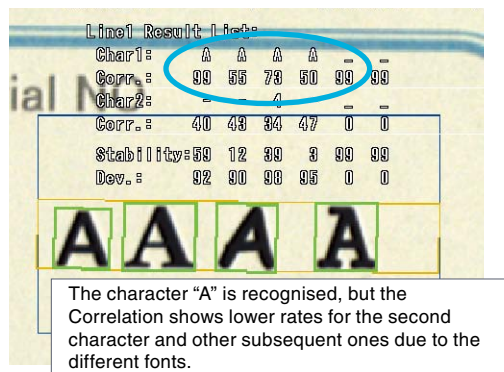
Ensuring accurate recognition with character print that varies: Sub pattern registration

The OCR Tool supports a sub pattern function which allows for the registration of multiple patterns (variations) for a single character. Up to 200 arbitrary character patterns can be registered in total, increasing the stability of recognition.

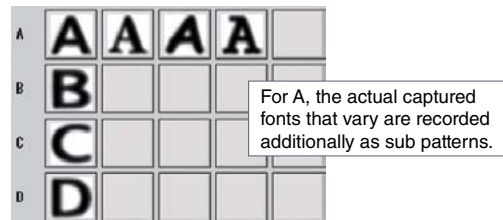
When only one character pattern registered per character



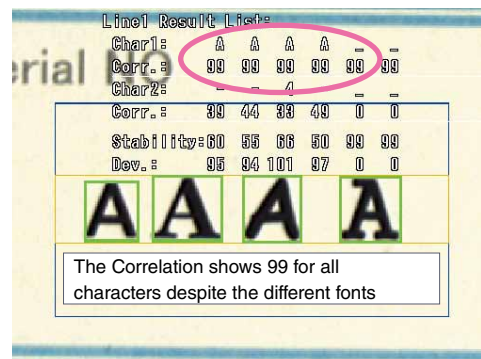
Before



When multiple character patterns registered for "A"



After



Recognition of encrypted dates including month and year: Date/time encryption setting

The values in the internal calendar can be converted into encrypted characters, and accordingly the reference character string can be converted into the encrypted characters by setting date/time encryption tolerance for the reference character string.

Setting the encryption table

Auto Inp Set	
Current	Text
0	A
1	B
2	C
3	D
4	E
5	F
6	G
7	H
8	J
9	K

Encrypting 0 to 9 by replacing them by A to K respectively

OCR CustomCalendar	Month
Year	Month Table No. 0
Month	01 AB
Day	02 AC
Hour	03 AD
Minute	04 AE
Shift	05 AF
	06 AG
	07 AH
	08 AJ
	09 AK
	10 BA
	11 BB
	12 BC

Setting the encrypted calendar for the reference character string

Enter Limits				
	String	eYear(0). eMonth(0). eDay(0)Shift(0)		
		Year	Month	Day Shift

Time Shifts can also be encrypted.

Image Processing Lineup

XG-8000 / XG-7000 Series

Ultimate Vision Solution

Vast lineup of area & line scan cameras using high speed distributed processing with a wide variety of flexible interfaces that can be fully customised to meet the exact customer requirements.



CV-X100 Series

Power Meets Simplicity

The Auto-Teach inspection tool recognises any differences on the target that do not conform to the trained good data. Multi-language support is incorporated for world-wide use by almost any user.



Lineup of lights that support a wide range of inspections



Direct ring light



Multi-angle ring light



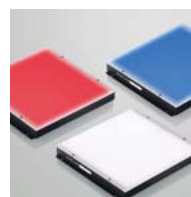
Multi-angle square light



Bar light



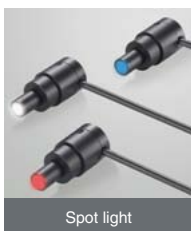
Dome light



Backlight



Coaxial light



Spot light



Low angle light



Square bar light



Line light



LED light controllers

Lineup of lenses that can be selected based on the camera type and accuracy requirements



Super high resolution/low distortion lenses



High resolution/low distortion lenses



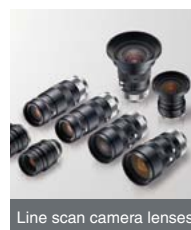
CCTV lenses



Macro lenses



Compact camera lenses



Line scan camera lenses

KEYENCE

Please visit: www.keyence.com



SAFETY INFORMATION

Please read the instruction manual carefully in order to safely operate any KEYENCE product.

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