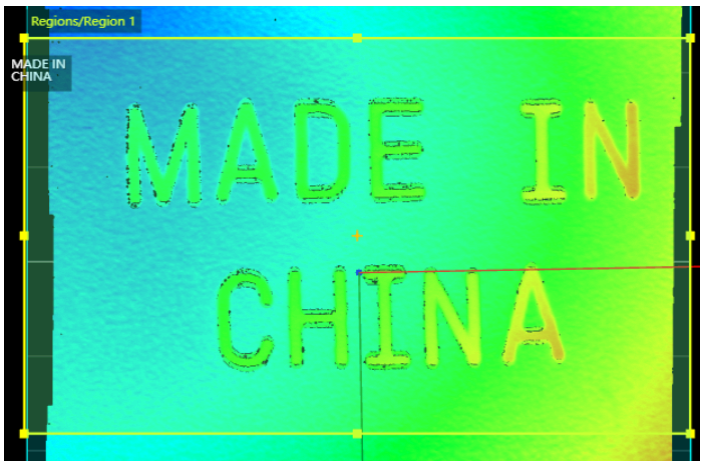
Surface OCR

Purpose

The Surface OCR (optical character recognition) tool lets you extract a string of text from surfaces, using either heightmap or intensity scan data. The tool is font-independent and already trained. The tool therefore lets you implement OCR without the need for a separate 2D camera system.

The tool also supports multi-line character recognition, however, currently the text must be rotated so that it is human-readable from left to right along the X axis.

Additionally, try to make the characters be parallel to the x axis because the tool doesn't support reading inclined characters well enough for the moment.



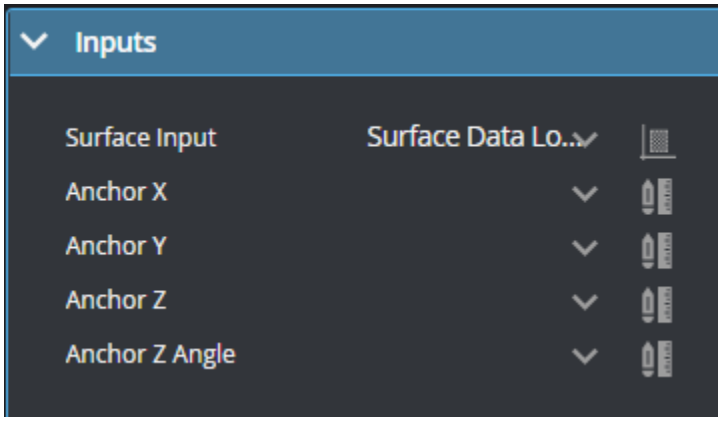
Characters are recognized correctly

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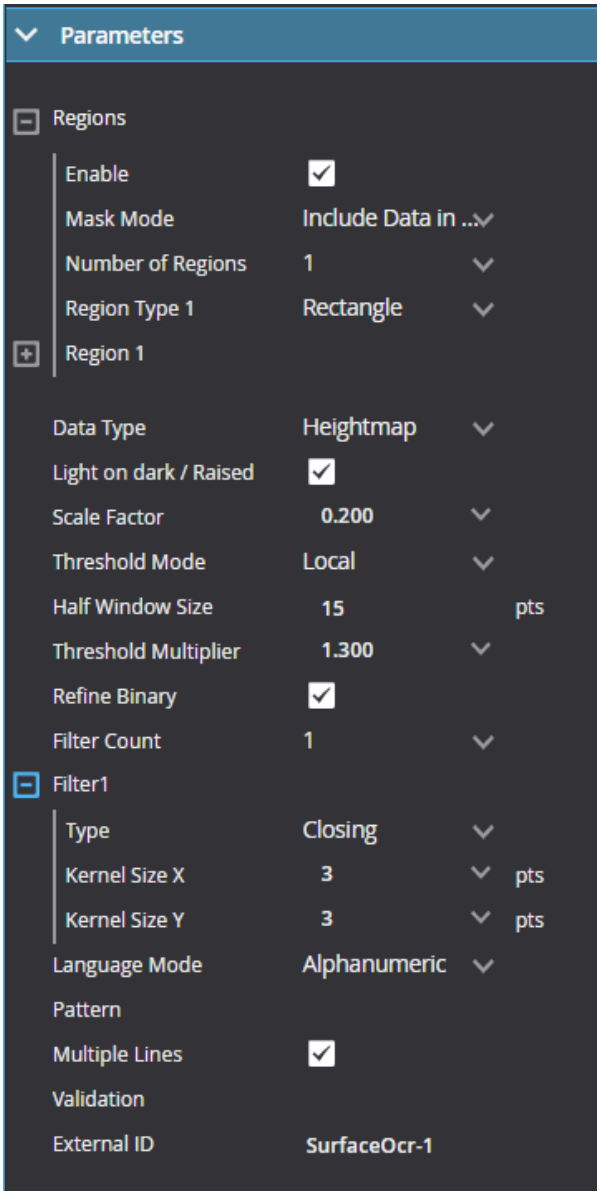
Inaccurate recognition due to tilt

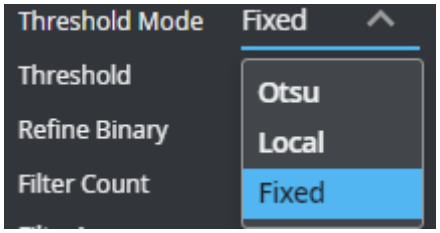
Inputs



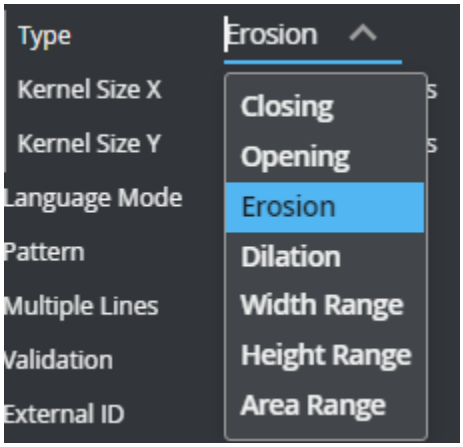
Name	Description
Surface Input	The surface data that the tool will apply filtering to. Only accept uniform (resampled) data.
Anchor X Anchor Y Anchor Z Anchor Z Angle	Lets you choose the X, Y, Z, or Z Angle measurement of another tool to use as a positional and rotational anchor for this tool.

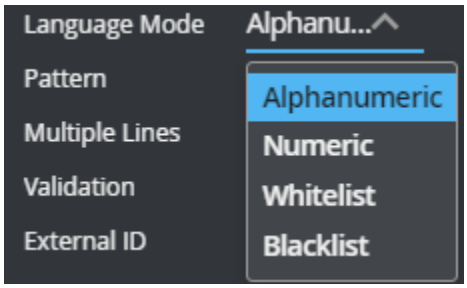
Parameters





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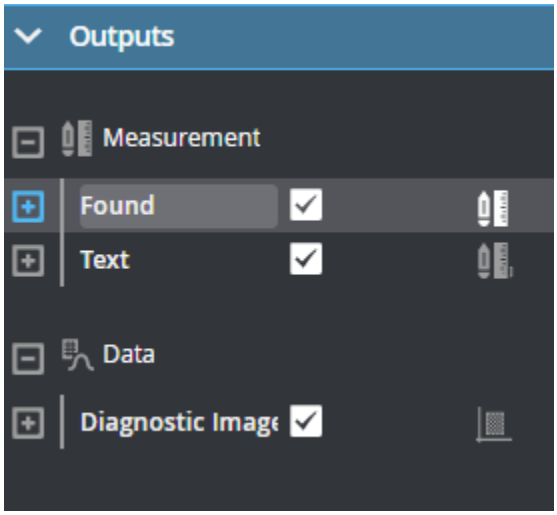
Name	Description
Regions	A flexible region whose data the tool will apply filters to.
Data Type	The tool uses intensity data or heightmap data for OCR task • Heightmap • Intensity
Light on Dark/Raised	If you are scanning light-on-dark texts or raised texts, enable this option.
Scale Factor	Shirk (<1.0) or enlarge (>1.0) the image to let the height of letters be around 50 pixels to achieve good recognition accuracy and speed performance
Threshold Mode	Determines the threshold the tool uses to identify characters relative to the background data. One of the following: • **Otsu:** Use this mode if the scan data has been pre-processed to remove any tilt of the surface on which you want to perform OCR, for example using Surface Transform; for more information, see Transform. • **Local**: The tool varies the threshold for each pixel based on the minimum and maximum values within a moving window over the region, using the specified window size and multiplier (see below). This method can compensate for intensity and height gradients. • **Fixed:** The tool uses a single, fixed threshold for the entire region (see Threshold below).

Half Window Size	The window size the tool uses for local thresholding. The window size should generally be larger than the size of the characters being detected. Displayed when **Threshold Mode** is set to **Local**.
Threshold Multiplier	The multiplier the tool uses for local thresholding. Typically set to a value close to 1. Displayed when **Threshold Mode** is set to **Local**.
Threshold	The manual threshold the tool uses, expressed as a percentage, converted to a 0-255 range, relative to minimum and maximum values within the region. Displayed when **Threshold Mode** is set to **Fixed**.
Refine Binary	After thresholding, if the binary image isn't good enough. Enable this checkbox to refine the binary image with several filters
Filter Count	Set how many filters to be used to refine binary
Filter {n} Type	Several filter types can be chosen to refine the binary image ● **Closing**: Use this type when the letters are broken or contains holes ● **Opening**: Use this type when there are noisy clusters which are small ● **Erosion**: Use it to remove small clusters or thin the letters ● **Dilation**: Use it to connect parts of a broken letter or enlarge a letter ● **Width Range**: Extract letters based on the width range ● **Height Range**: Extract letters based on the height range ● **Area Range**: Extract letters based on the area range
Kernel Size X/Y	Set kernel size for the first 4 filter types
Max/Min Width Max/Min Height Max/Min Area	Set the range for the last 3 filter types
Language Mode	Limits the characters the tool will recognize. Choose the mode based on the expected types of characters in the target. One of the following:

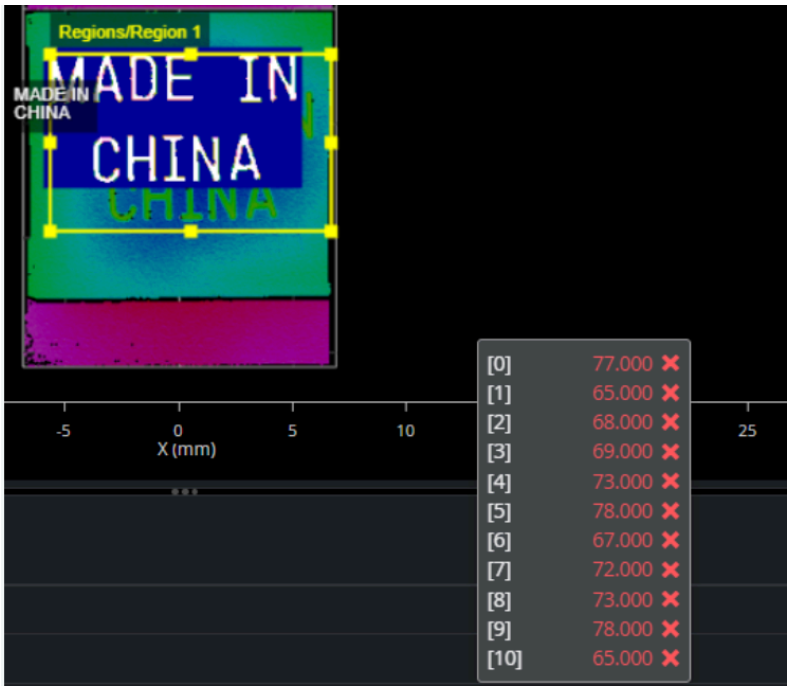
	Alphanumeric – Only attempts to recognize alphanumeric characters. **Numeric** – Only attempts to recognize numeric characters. **Whitelist** – Only attempts to recognize the characters in the Whitelist parameter that this option displays. **Blacklist** – Will not attempt to recognize characters in the Blacklist parameter that this option displays.
Pattern	To denote a character class use one of: ● \c - unichar for which UNICHARSET::get_isalpha() is true (character) ● \d - unichar for which UNICHARSET::get_isdigit() is true ● \n - unichar for which UNICHARSET::get_isdigit() or UNICHARSET::isalpha() are true ● \p - unichar for which UNICHARSET::get_ispunct() is true ● \a - unichar for which UNICHARSET::get_islower() is true ● \A - unichar for which UNICHARSET::get_isupper() is true ● * could be specified after each character or pattern to indicate that the character/pattern can be repeated any number of times before the next character/pattern occurs. Examples: 1-8\d\d-GOOG-411 will be expanded to strings: 1-800-GOOG-411, 1-801-GOOG-411, ... 1-899-GOOG-411. http://www.\n*.com will be expanded to strings like: http://www.a.com … http://www.a123.com…http://www.ABCDefgHIJKLMNop.com
Multiple Lines	When enabled, able to recognize multiple lines of texts. To achieve good speed performance, turn it off when there is only one line of texts to recognize
Validation	Expected string to be compared with the recognized string. Note the internal comparison ignores white spaces and newlines from both strings

A rule of thumb is to adjust the parameters interactively based on the data output **Diagnostic Image**. The goal is to ensure the image is clean and free of noises. Meanwhile, check the recognition results which are displayed on the visualizer

Outputs



Type	Name	Description
Measurement	Found	1 if the two strings are identical after removing all white spaces and newlines. Otherwise, it is 0
Arrayed Measurement	Text	The recognized string in the format of an array of ASCII values with white spaces and newlines ignored

		
Data Output	Diagnostic Image	The data the tool uses to perform optical character recognition. Interactively adjust most of the parameters (Threshold Mode, Filter Type, etc.) based on this image

Major Revisions

1. The migrated tool matches the beta Surface OCR Advanced instead of the standard Surface OCR in Classic
2. Recognized texts are sent through an array of values (the arrayed measurement “Text”) in GoPxL, while Classic sends it through generic output (the data output “Output String”)
3. Regarding filter types, adopt the convention from Surface Filter
    - **Closing** instead of **Close**
    - **Opening** instead of **Open**
    - **Erosion** instead of **Erose**
    - **Dilation** instead of **Dilate**
4. Use a group of flexible regions (up to 16 regions) instead of a single flexible region in Classic
5. Remove the measurement “Time”
6. Remove the checkbox “Use Validation”

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