



IKOSA®

Application Documentation

Application Name	Network Formation Assay
Version	1.0.0
Documentation Version	10.10.2019 - 1
Input Image(s)	Single Image (standard, grayscale) RGB images are automatically converted to grayscale images
Input Parameter(s)	None
Keywords	network, tube, formation, in-vitro, angiogenesis, vessel, growth, microscopy, matrigel
Short Description	Detection of branching points, loops, and cell coverage in network formation assay used for in-vitro angiogenesis research.
References / Literature	For more information regarding the assay check e.g. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3230200/ ; Reference laboratory: Department of Obstetrics and Gynecology: Dr. Ursula Hiden; Jasmin Strutz, MSc;

Table of Contents

IKOSA® Image Analysis	2
Application Description	2
Sample Data and Further Information	2
Requirements	3
Input Image(s)	3
Input Parameter(s)	3
Results	4
Files	4
Description of files	5



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IKOSA® Image Analysis

You can use this or any other of our image analysis applications through your IKOSA® account. If it is not listed in the available applications, please contact your organization's IKOSA® administrator or our team at support@kmlvision.com.

Application Description

This application automatically segments the network created by cells in a 2D network (tube) formation assay, typically on an extracellular matrix such as provided as the growth-factor reduced Matrigel® assay, and extracts relevant measures (loops, branching points, covered area).

In the following, the requirements for an accurate analysis are given and the output of the applications is described.

Sample Data and Further Information

Sample Data: To try out this application, sample images can be downloaded here: https://drive.google.com/open?id=1WnUnZr4qbXp6-vpEvPfla8yBqW_Ko3-P.

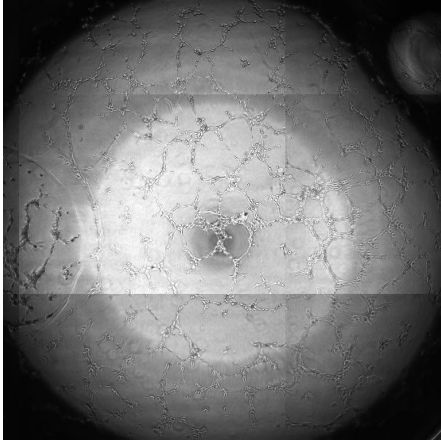
If you have any questions regarding this application or if you want to know if your specific type of images can be analyzed, please get in touch with us at support@kmlvision.com. Also, if you have requests or ideas regarding additional image analysis applications that you would require, please get in touch with us at support@kmlvision.com.

For more information, please visit www.ikosa.ai.

Requirements

Input Image(s)

Input for this application is the following image data:

No.	Image data	Type of image	Color Channels	Color Depth (per channel)	Size [Px]	Resolution [$\mu\text{m}/\text{Px}$]
#1	Single image	Standard	1 (Greyscale) 3 (RGB)	8 Bit	Min: 600 x 600 Max: 6832 x 5124	typically: 1.75
<p>Image Content: Microscopy image of 2D network ("tube") formation assay, typically taken with 4x magnification.</p> <p>Additional requirements: None</p> <p>Examples:</p> 						

For all images, the following requirements apply:

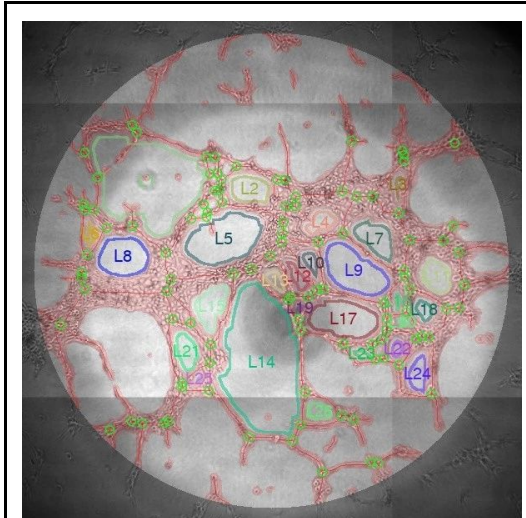
- The illumination must be constant throughout the image(s).
- The sample must be in focus, i.e. no blurry regions in image(s).

Input Parameter(s)

No additional input parameters are required for this application.

Results

Files

No.	File type	Content and Description
1	jpg	<i>segmentation.jpg</i> : An image with the same image dimensions as the input image, showing the segmentation of the tubes/cells. The image contains for each pixel a likelihood for being a tube. Values are in the range between 0 and 255.
2	csv	<i>statistics.csv</i> : A csv file containing statistics about input image.
3	csv	<i>statistics_loops.csv</i> : A csv file containing statistics about detected loops.
4	jpg	<p><i>visualization.jpg</i>: A visualization of the detection:</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <ul style="list-style-type: none"> • Branching points are visualized as green circles. • The area covered by cells is shown in red. • The Loops are visualized using different colors and labelled with L followed by the loop id. The loop id corresponds to the id in <i>statistics_loops.csv</i>. </div> </div>



Description of files

File no. 2: Single csv-file with the following content (*statistics.csv*):

Col. no.	Column name	Examples	Value range	Description
1	branching points	104	0 -	Number of detected branching points.
2	covered area	93869	0 - #of pixels in image	Total area covered by cells or tubes in pixels.
3	num_tubes	190	0 -	Number of Tubes detected.
4	total_tube_length	6641.4	0 - #of pixels in image	Total length of all tubes in pixels.

File no. 3: Single csv-file with the following content (*statistics_loops.csv*):

Col. no.	Column name	Examples	Value range	Description
1	id	1	1 -	Loop id.
2	area	10747	0 - #of pixels in image	Area of the loop in pixels.
3	perimeter	452.3	0 -	Perimeter of loop in pixels.