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Understanding Images

Definiens

Tissue Studio® 3.0

Release Notes

DEEPER INSIGHTS
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Definiens Documentation:

Definiens Tissue Studio® 3.0

Release Notes

Imprint

Dear User,

Thank you for using Definiens software. We appreciate being of service to you with image intelligence solutions. At Definiens we constantly strive to improve our products. We therefore appreciate all comments and suggestions for improvements concerning our software, training, and documentation. Feel free to contact us via web form on the Definiens support website www.definiens.com/support

Thank you.

Legal Notes

Regulatory affairs

Under certain circumstances the solutions and applications developed using Definiens Developer XD may fall under specific regulations (e.g. medical device or IVD regulations) in your country. Please ensure that you check and follow local regulations before using or taking your solution or application into commerce. If you require specific data about Definiens Developer XD, please contact your dealer or our sales staff.

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1 Overview

Definiens Tissue Studio® is an image analysis product that provides functionality to support the pathologist in analyzing standard assays in histopathology. It enables non-technical users to configure, calibrate and execute versatile image analysis workflows. The software supports all major acquisition devices and users can analyze all kinds of tissue slides, tissue micro arrays and microscope images.

With the built-in Definiens Composer Technology™, regions of interest can be extracted from images by selecting samples and train the software how to find the regions of interest. Once the training is finished, Definiens Tissue Studio® can extract the regions from an unlimited number of images.

A library of pre-defined image analysis solutions for typical every-day problems is provided that can be calibrated for the particular image data set, using Definiens Composer Technology™ and/or simple graphic sliders. These calibrated applications can be saved and submitted for batch execution.

Definiens Tissue Studio® allows the user to quantify IHC, fluorescence and other histological assays on a cell-by-cell basis.

1.1 About Definiens Tissue Studio® 3.0

Definiens Tissue Studio® 3.0 is a major release. A substantial amount of new functionality has been added to the product. Additionally, it includes about 20 bugfixes to Definiens Tissue Studio® 2.1.1 and is a recommended update for customers using any previous version of Definiens Tissue Studio.

1.2 Key Features

- Region of interest (ROI) detection
    - Automatic ROI detection: The new and improved Definiens Composer™ technology utilizing a learn-by-example approach
    - Improve your workflow and time to result: The ROI quality control and correction step
    - Refine your result: Composer Segmentation modules: Improved functionality and new module for reclassification
    - Address the most complex ROI detection tasks: Develop a ROI Detection plugin for Definiens Tissue Studio® with Definiens Developer XD
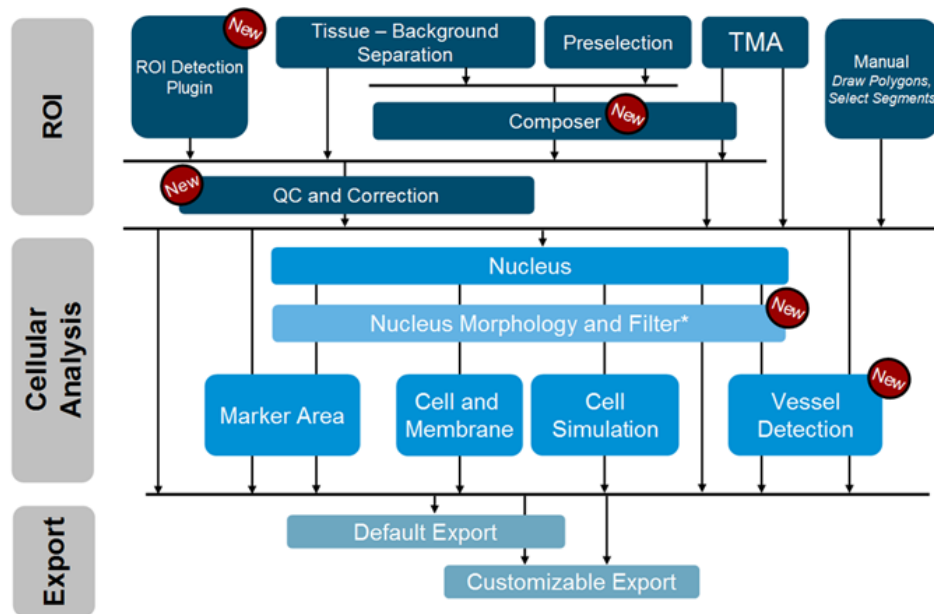
Figure 1.1. Overview of available actions in Definiens Tissue Studio (to reduce complexity, classification actions are not displayed)

- New modules
    - Angiogenesis: Detect and reconstruct stained vessels in Xenograft samples
    - Nucleus Morphology: Filter your nuclei by morphology, e.g. to extract epithelial nuclei from your samples
- Improvements and extensions
    - Parallel analysis of red and brown chromogenes
    - Cell simulation insides stained areas
        * Get cells inside regions marked with cytokeratin markers only
        * Identify immunostained cells in tumor samples
    - Better memory utlilization with native 64bit version
    - Improved usability and speed
- Connectivity to image and data management systems
    - Aperio Spectrum
    - Leica Slidepath

For a complete list of new features, please have a look at the sections below.

2 New Features, Bug Fixes and Errata

2.1 New Features

See on this page, *Features New to Tissue Studio 3.0*.

Table 2.1. Features New to Tissue Studio 3.0

Category	Reference	Description
User Interface	16408	Allow creation of multiscene-projects with up to 12 images or subsets
User Interface	16807	Display image name during configuration
User Interface	16910	Scene information window for each preview/action
User Interface	16629	Save windows layout for each workflow tab
Data I/O	15817	Aperio Spectrum connectivity
Data I/O	16404	Import of Aperio Annotations
Data I/O	16271	Path lengths not limited to 260 characters
ROI Detection	16675	Manual Selection actions work on training data set
ROI Detection	13694	Composer: Create Region: Add option for morphology in addition to simple grow
ROI Detection	16397	Definiens Developer XD Plugin Template for ROI Detection
ROI Detection	16399	New Action: Composer: Initialization: Allow higher magnification for Composer
ROI Detection	16400	New Action: Composer: Training: Replaces first and second training

Continues...

Category	Reference	Description
ROI Detection	16402	Composer: Add option for slide preview during configuration
ROI Detection	16403	New Action: Composer: Reclassify Region
ROI Detection	16405	New Action: ROI QC and Correction
ROI Detection	16407	Remove action Xenograft Detection
ROI Detection	16419	General Settings: Introduce option to process regions individually or not
ROI Detection	17224	Manual ROI Selection actions: extend to eight classes
ROI Detection	16613	Composer: Segmentation actions: Allow to insert the same action two times in a row
Cellular Analysis	16110	Marker Area Detection: Extend to use three stains (dual IHC)
Cellular Analysis	16398	Nucleus Detection: Improve for dark/black stains
Cellular Analysis	16409	Cell Simulation: Add option to simulate cells inside cytoplasmic stains
Cellular Analysis	16410	Nucleus Detection (IF portals): Add channel mask
Cellular Analysis	16411	New Action: Vessel Detection
Cellular Analysis	17287	New Action: Vessel Classification
Cellular Analysis	16412	Nucleus Detection: Activate for H&E
Cellular Analysis	16413	Nucleus Classification: Activate for H&E
Cellular Analysis	16414, 16415	Increase Speed of Cellular Analysis actions
Cellular Analysis	16608	New Action: Nucleus Morphology and Filter
Cellular Analysis	17054	Cell Simulation (IF portals): Include multi-layer selection widget for creation of consensus layer
Cellular Analysis	17538	Marker Area Classification: add option "None" for classfication
Export	15096	Export all configured parameters that belong to a solution
Export	16381	Add solution name to analysis report
Export	16965	Meaningful order of columns in default export

Continues. . .

Category	Reference	Description
Export	17504	Replace Membrane/Cytoplasm Ratio by Membrane/Cytoplasm Contrast
Other	16679	64bit software installer

2.2 Bug Fixes

See table 2.2 on the current page, *Bugs Fixed in Tissue Studio 3.0*.

Table 2.2. Bugs Fixed in Tissue Studio 3.0

Category	Reference	Description
Data I/O	16650	Olympus file format: Magnification is wrongly set to default (20x)
User Interface	16659, 16695	Improve descriptions and error messages
User Interface	16777	Processed scene shows main and ROIDetection maps
ROI Detection	17417	Tissue-Background Separation: Preview does not work if initial brightness threshold is too high such that no tissue is found
ROI Detection	17554	Tissue-Background Separation: Preview with autothresholds does not update parameters
ROI Detection	17658	Manual Selection (Draw Polygons): Polygon is not completely transfered to cellular analysis
Cellular Analysis	15745	Nucleus Detection IF: Nuclei are built with corona
Cellular Analysis	16427	Nucleus Classification: Automatic threshold calculation not functional
Cellular Analysis	17015, 17382	Nucleus Detection & Cell Simulation IF: Configuration can lead to error message "Specified class '0' does not exist."
Cellular Analysis	17207	Membranes & Cells: No cell is created from nucleus completely surrounded by other nuclei
Export	16179	Average Membrane/Cytoplasm ratio may have unsignificant value due to very high or negative outliers
Export	16706	Export screenshots without equalization
Export	16765	TMA portals: No Analysis Report for configurations without ROI Detection

Continues...

Category	Reference	Description
Export	17332	Marker Area IF: Colocalization: Correlation coefficients are not exported per ROI or per slide
TMA	16931	Remove options to define training data set for TMA portals
Processing	16967	TMA configuration without Cellular Analysis: Processed project and screenshots do not display classification

2.3   Known Issues and Limitations

See table 2.3 on this page, *Known Issues and Limitations in Tissue Studio™ 3.0*.

Table 2.3. Known Issues and Limitations in Tissue Studio™ 3.0

Category	Reference	Description
TMA	15650	Known Issue: Core selection does not work after Initialize Cellular Analysis has been executed (all cores are selected). Workaround: Adjust Magnification in "Select Cores for Composer".
Processing	15605	Limitation: The detection algorithms on fluorescence images work on data with 8 bit per channel only.
Processing	N/A	Limitation: The ROI Detection algorithms work on the first six fluorescence channels only. Additional channels are ignored. Data export and visualization is possible for up to 12 channels.
Processing	18163	Limitation: In Composer: Cut at Bottleneck the Width to cut (μm) is evaluated as a pixel distance x 2, not as a μm distance.
Export	18154	Limitation: In the default export for Marker Area Detection (IF) the Average Intensity Markers 1 and 2 and 3 Overlap is incorrectly evaluated as zero for some layers.

2.4   Document Errata

None

3 Additional Information

3.1 Solution Files from Previous Versions

Solution files from version 2.1.0 and above can be loaded with Definiens Tissue Studio 3.0. If an old solution file is loaded, the software will enter into a compatibility mode with the respective version. If you would like to leave this compatibility mode, press the button New Solution or load a solution that has been created with Definiens Tissue Studio 3.0.

3.2 Using Manual Selections from TissueMap 3.1 in Tissue Studio

Definiens TissueMap and Definiens Tissue Studio are two different products. The workspace layout has been changed. Due to this, users of TissueMap 3.1 can not use the manually created regions in Tissue Studio automatically. However, the workspaces with manually created region selections can be converted. Please contact Definiens product support at support@definiens.com to get the tool to convert workspaces.

3.3 Contact

If you have any additional questions, please contact your account manager or write a mail to support@definiens.com.

Acknowledgments

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