Image Processing and Analysis with KNIME

Nycomed Chair for Bioinformatics and Information Mining
Department of Computer and Information Science
Konstanz University, Germany
Agenda

• KNIME
• Image Processing and Analysis Extension
• Example Workflow
What’s KNIME?

• Development was started 2004
• Current Version: KNIME 2.8
• Used by over 3000 organizations in more than 60 countries
• Used in pharmaceutical companies, life science, banks, publishers, consulting firms, research, ...
What’s KNIME?

- Data integration, processing, analysis and exploration platform
- User-friendly & open-source
- Software integration platform
- Highly modular, easily extendible
- Workflow based & Cluster execution

www.knime.org
The KNIME Platform

**Workflow Projects**
Each workflow refers to a workflow project. All projects are displayed here. Import and export of workflows is supported. Status (closed, idle, executing and executed) is indicated by an icon.

**Favorite Nodes**
Manage your favorite, most frequently used and last used nodes. Nodes are added to favorites by dragging them from Node Repository into favorite nodes category.

**Node Repository**
Find here all KNIME nodes ordered by categories. Help for selected nodes are displayed in the Node Description. Drag them onto the workbench in order to use them.

**Workflow Editor**
Here are the workflows assembled by dragging nodes onto it, connecting, configuring and executing them.

**Node Description**
Provides help about the selected node, its dialog options, views, expected input data, and resulting output.

**Outline**
Overview over the workflow and navigation help for large workflows.

**Console**
Status information, warning and error messages are logged here. This information is also written to a log file. Change level of detail under Preferences/KNIME/KNIME GUI.
What’s KNIME?
What’s KNIME?
KNIME as integration platform

Use several software solutions directly in one tool.
The Image Processing and Analysis Extension(s)

http://tech.knime.org/community/community/image-processing
# Image Processing and Analysis Nodes

## Input/Output
- **IO**
  - Convolution Kernel Creator
  - Image File Linker
  - Image Importer
  - Structuring Element Creator
  - Image Generator
  - Image Reader
  - Image Writer

## Feature Calculation
- **Features**
  - Image Features
  - Image Properties
  - Image Segment Features
  - Labeling Properties
  - Segment Features

## Views
- **Views**
  - Image Parameter Adjuster
  - Interactive Segmentation View
  - Table Cell Viewer

## Image Proc.
- **Image**
  - Binary Image Operations
  - Convex Hull
  - Distance Map
  - Fill Holes
  - Morphological Image Operations
- **Filters**
  - Anisotropic Diffusion
  - Average Filter
  - Bilateral Filter
  - Convolver
  - Gaussian Convolution
  - Max Filter
  - Max Homogeneity
  - Median Filter
  - Min Filter
  - QuantileFilter
  - Sigma Filter
  - Sobel Filter
  - Variance Filter
- **Metadata**
  - Dimension Cleaner
  - Dimension Extender
  - Set Image Metadata
  - Transfer Image Metadata
  - Convert Image Metadata
- **Misc**
  - Img to DataRow

## Segmentation
- **Labeling**
  - Apply Color Settings To Labels
  - Cell Clump Splitter
  - Connected Component Analysis
  - Contour Detector (deprecated)
  - Extract Outline Labeling
  - GraphCut 2D
  - Image Annotator
  - Interactive Annotator
  - Label Transformer
  - Labeling Arithmetic
  - Labeling Converter
  - Labeling Filter
  - Labeling to Image
  - Labeling to PNG Images
  - Labeling to RGB Img
  - Labeling to String based Labeling
  - Labeling to Table
  - Morphological Labeling Operations
  - Orthogonal Label Cropper
  - Seed Generator
  - Seeded Watershed
  - Segment Cropper
  - Transfer Labels
  - Voronoi Segmentation

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Integrations

- ImgLib2

- ImageJ/Fiji
Integrations

• ImageJ2

• SCIFIO/Bioform

• OMEROR
Example Workflow
Example: High-Content Screening

positive

negative
Example: High-Content Screening
Example: High-Content Screening
Example: High-Content Screening
Example: High-Content Screening
Example: High-Content Screening
Example: High-Content Screening
Example: High-Content Screening

![Image of a table and a graph showing data analysis with color coding and text annotations. The table includes columns for Row ID, Weight, Mass, and Bitmask, with corresponding data values and color indicators for classification or other analysis purposes.]

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Example: High-Content Screening
Resources

• Homepage: http://tech.knime.org/community/image-processing

• Forum: http://tech.knime.org/forum/knime-image-processing

• Contact: Christian.Dietz@uni-konstanz.de
             Martin.Horn@uni-konstanz.de
             Michael.Zinsmaier@uni-konstanz.de
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• The Organizers

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