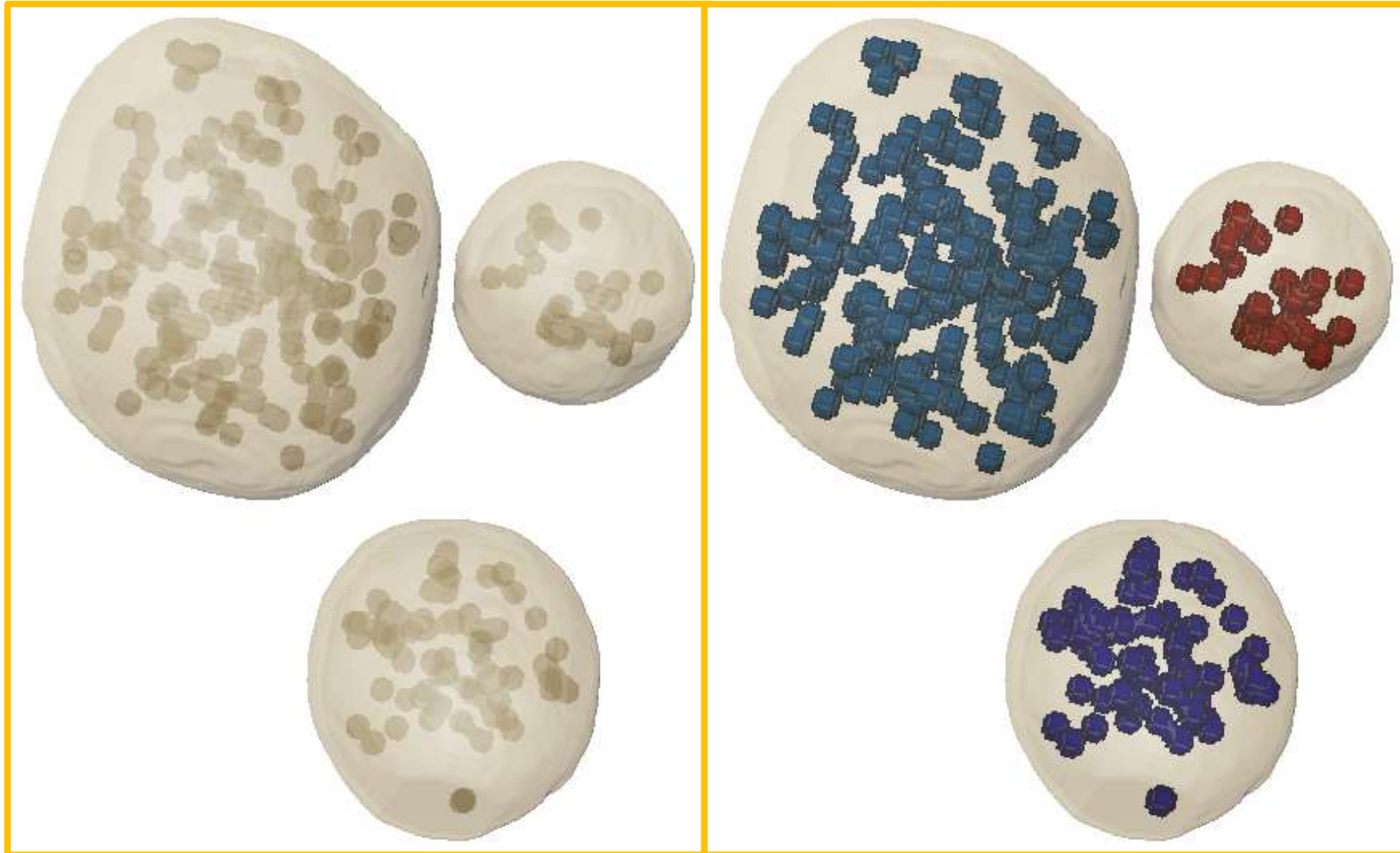




Avizo 2019.3: A relative pore fraction for each separated grains



3 porous grains

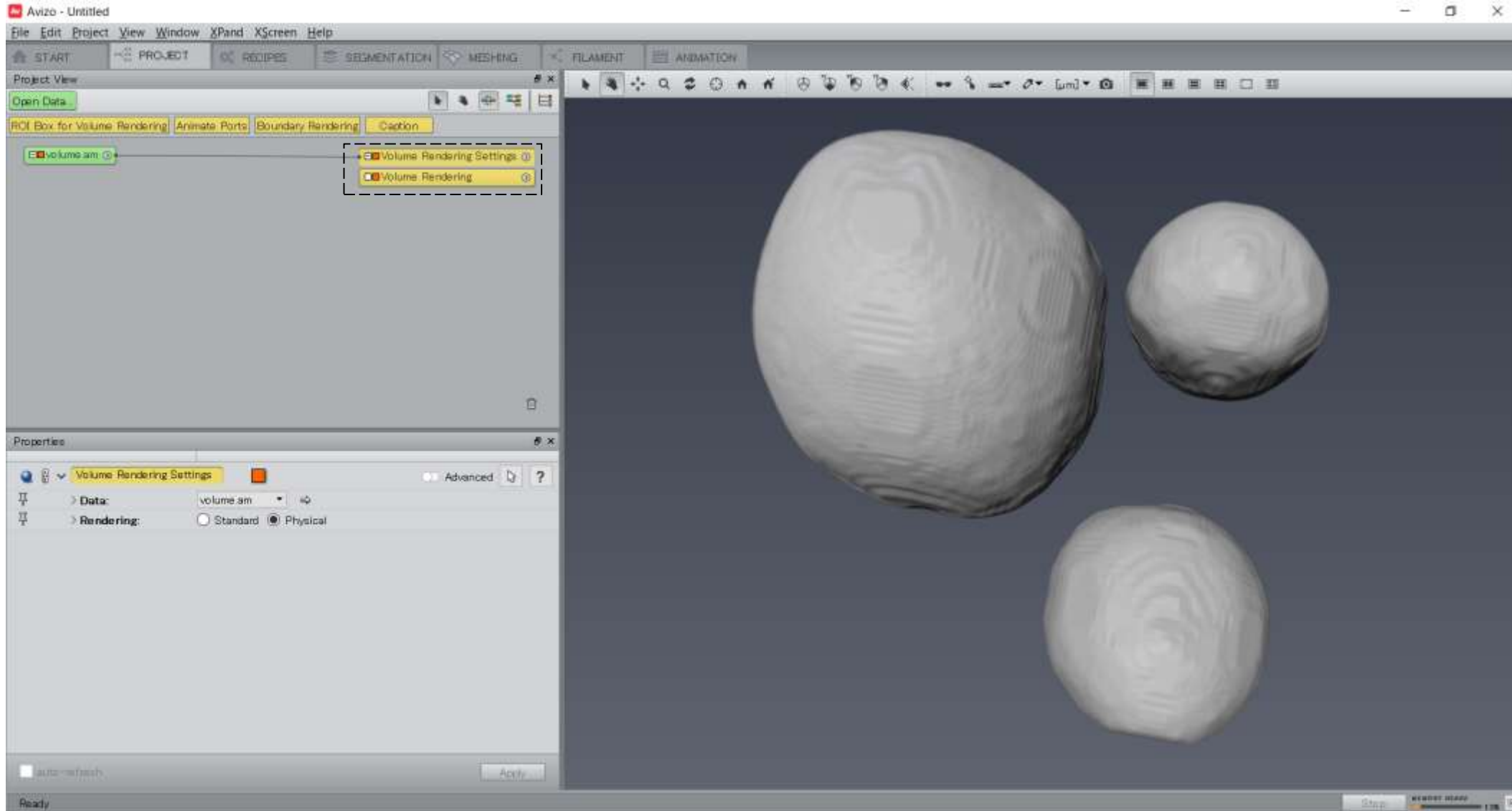


A relative pore fraction
of each grains

1. Open Data
2. Auto Thresholding
3. Fill Holes
4. Arithmetic
5. Labeling
6. Arithmetic
7. Label Analysis
8. Label to Attribute
9. Label Analysis
10. Custom Label

1. Open Data

Load “volume.am” data => Attach “Volume Rendering” module: display data



2. Auto Thresholding

Attach “Auto Thresholding” module => click “Apply”: binarization of data

The screenshot displays the Avizo software interface. The central 3D view shows three blue, textured spheres. The left sidebar contains a Project View with a flowchart showing the 'Auto Thresholding' module connected to 'volume.am' and 'volume.info*'. The bottom-left Properties panel is configured for the 'Auto Thresholding' module with the following settings:

- Input Image: volume.am
- Type: Auto Threshold High
- Interpretation: ☒ 3D ☐ XY planes
- Mode: min-max
- Criterion: factorisation

The bottom-right 'Tables' panel shows the 'volume.info' table with the following data:

	Image	Auto_threshold	Method
Mean	--	114.0	--
Min	--	114.0	--
Max	--	114.0	--
Median	--	0.0	--
Variance	--	0.0	--
Kurtosis	--	--	--
Skewness	--	--	--

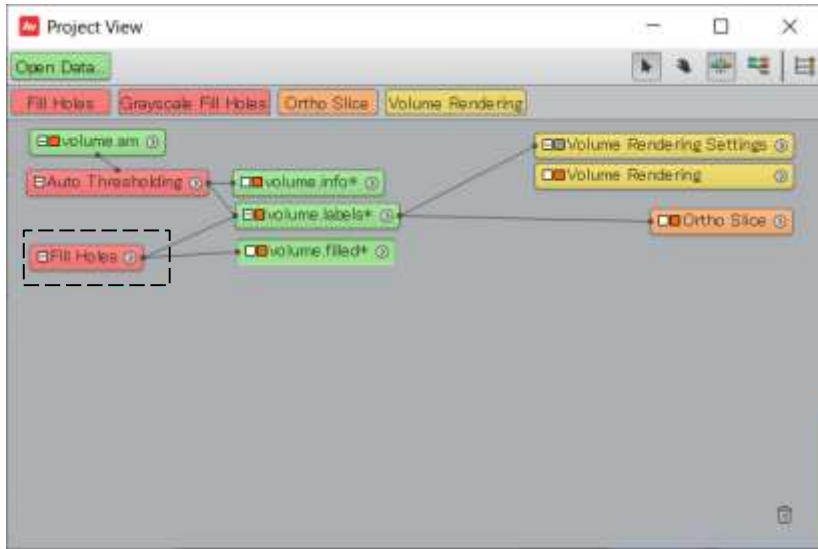
Below this, a table for the processed volume is shown:

	Image	Auto_threshold	Method
1	volu...	114.0	factori...

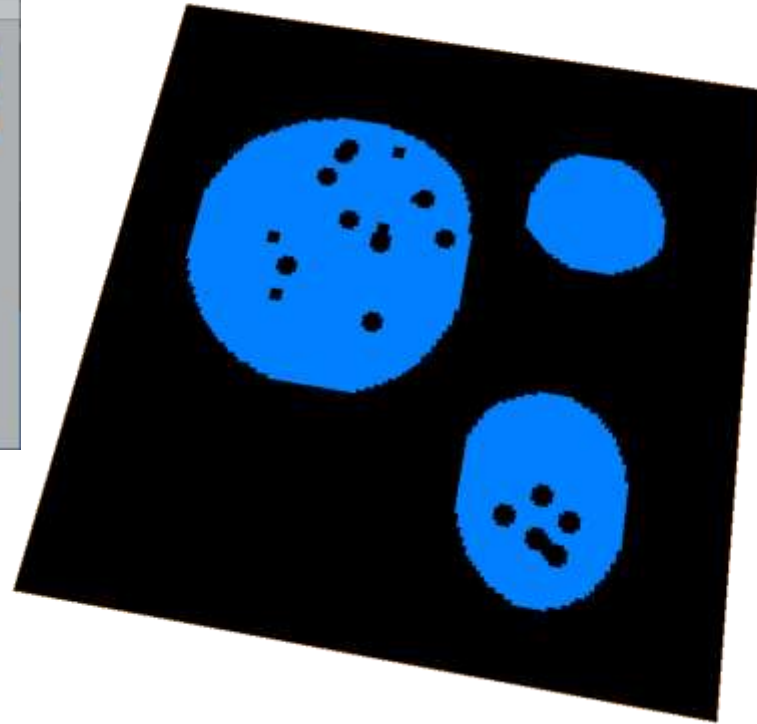
The 'Apply' button is visible at the bottom of the Properties panel.

3. Fill Holes

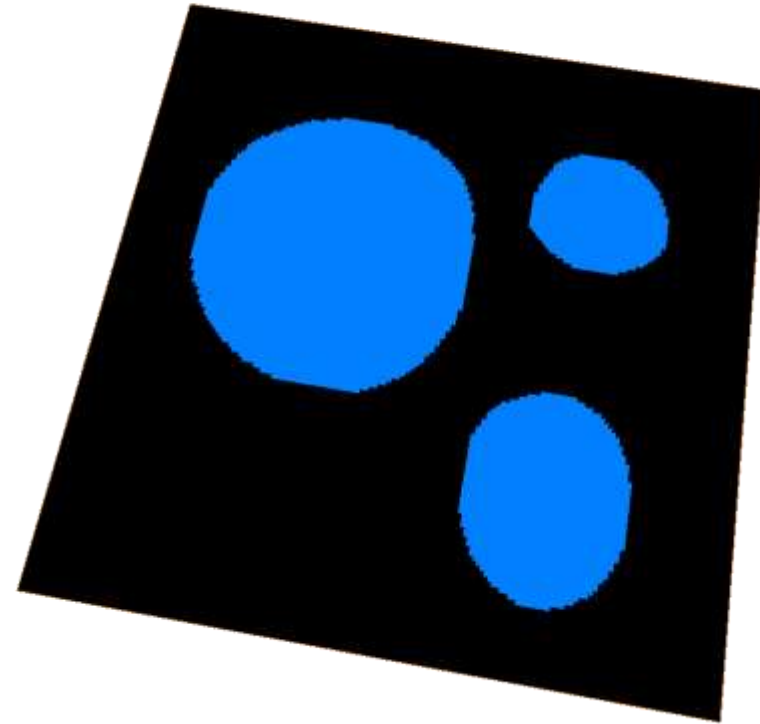
Attach “Fill Holes” module => click “Apply”: fill holes in grains



Input: “volume.labels”

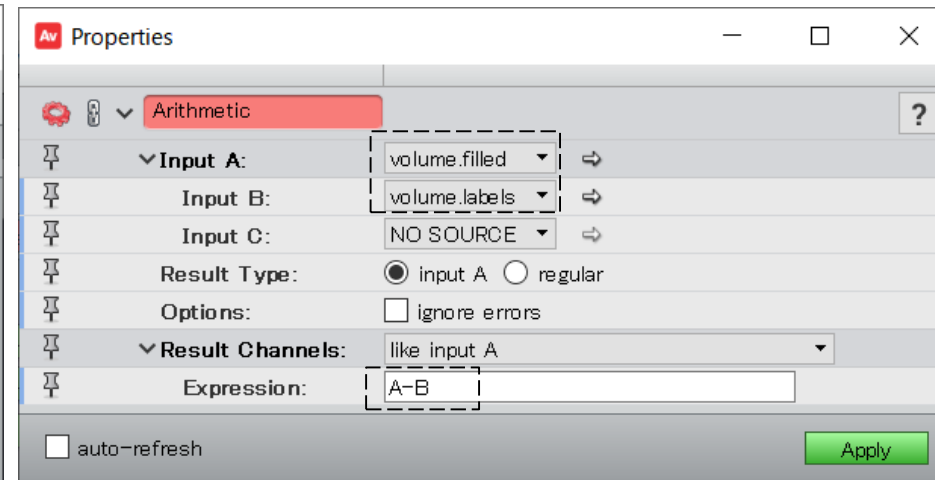
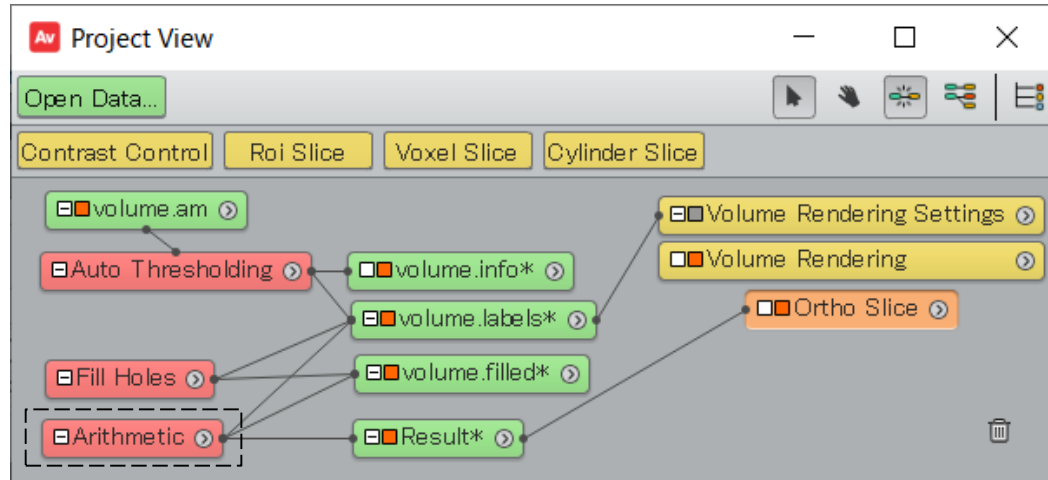


Output: “volume.filled”



4. Arithmetic

Attach “Arithmetic” module => click “Apply”: Arithmetic volume data

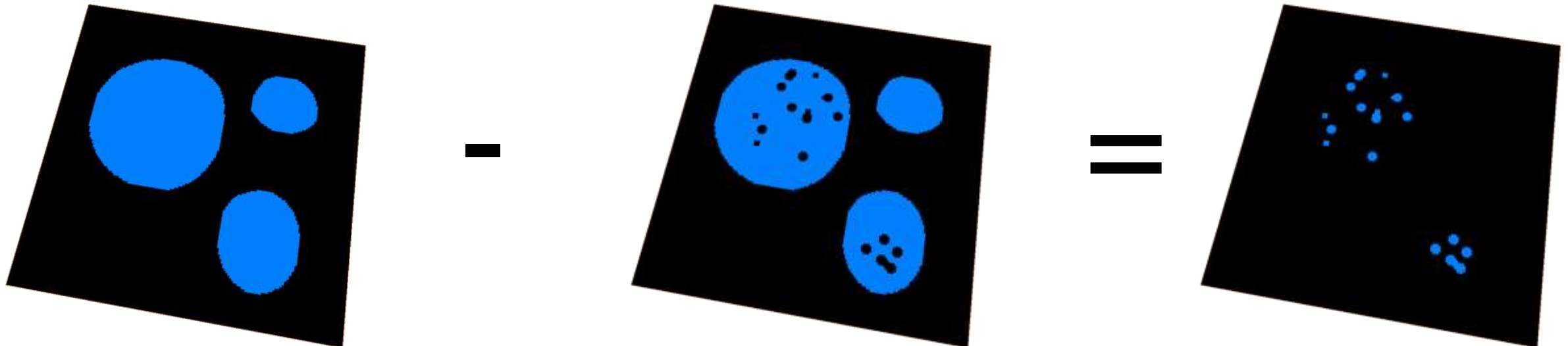


$$A - B = \text{output}$$

Input A: volume.filled

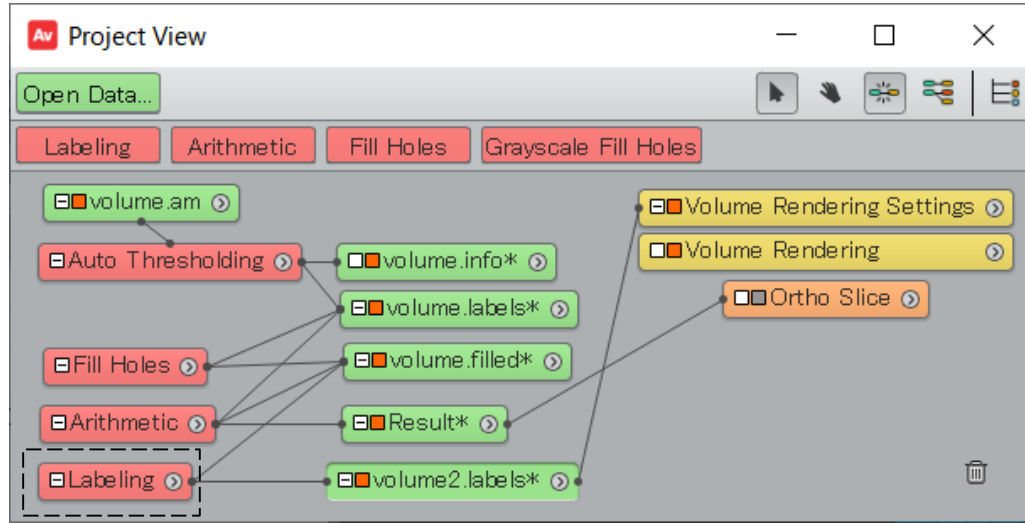
Input B: volume.labels

Output: Result



5. Labeling

Attach “Labeling” module => click “Apply”: labeling separated grains



Input: “volume.filled”

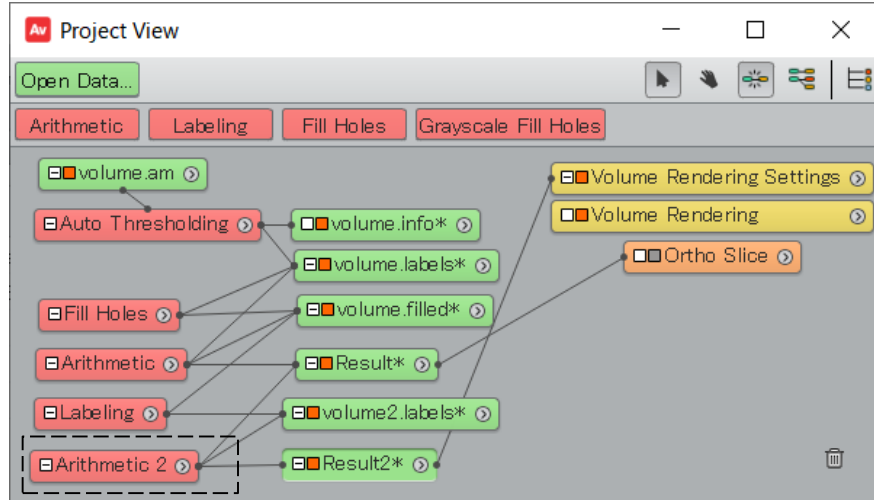


Output: “volume2.labels”

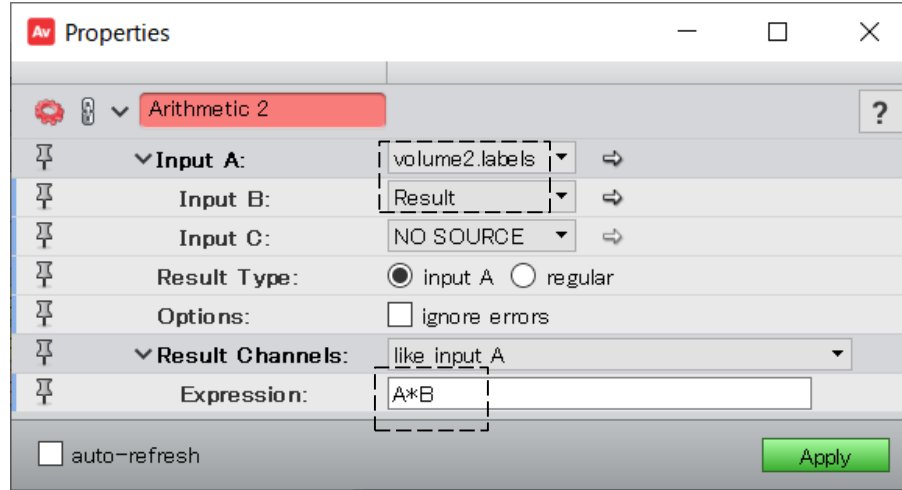


6. Arithmetic

Attach “Arithmetic” module => click “Apply”: Arithmetic volume data



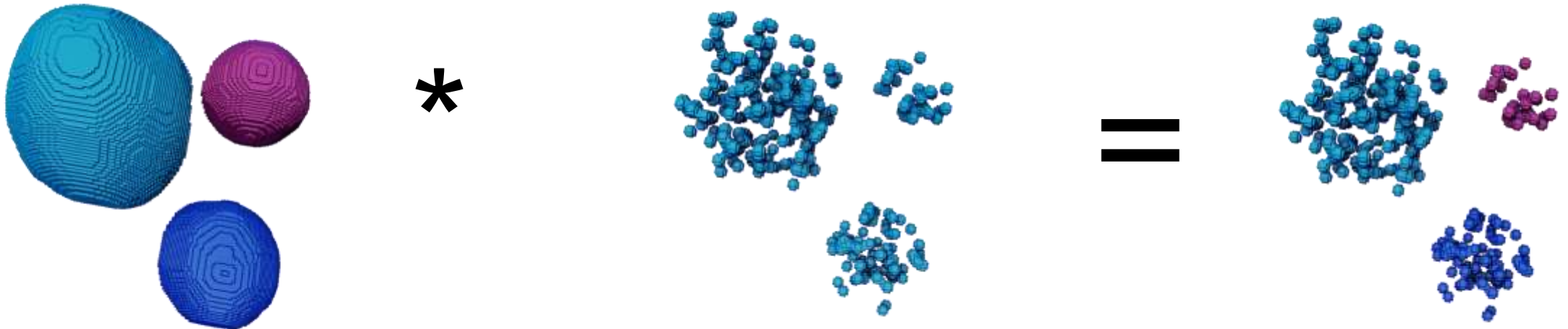
Input A: volume2.labels



Input B: Result

$$A * B = \text{output}$$

Output: Result2



7. Label Analysis

Attach “Label Analysis” module => click “Apply”: get the numeric data of label

The screenshot shows the 'Project View' window on the left and the 'Tables' window on the right. The 'Project View' window displays a workflow diagram with various modules. The 'Tables' window shows the output of the 'Label Analysis' module, which is highlighted with a dashed box in the workflow.

Project View Workflow:

- Input: volume.am
- Auto Thresholding
- Fill Holes
- Arithmetic
- Labeling
- Arithmetic 2
- Intermediate outputs: volume.info, volume.labels, volume.filled, Result, volume2.labels, Result2
- Label Analysis (highlighted)
- Output: volume2.Label-Analysis*

Tables Window: volume2.Label-Analysis

	Volume3d (μm^3)	Area3d (μm^2)	BaryCenterX (μm)	BaryCenterY (μm)	BaryCenterZ (μm)	Mean	index
Mean	1.57151e+14	1.34654e+10	57967.7	57968.4	78922.9	2.0	2.0
Min	5.8895e+13	7.37006e+09	27155.5	43853.7	36246.8	1.0	1.0
Max	3.01867e+14	2.18408e+10	99420.7	84174.4	101700.1	3.0	3.0
Median	5.8895e+13	7.37006e+09	27155.5	45877.2	101700.1	3.0	3.0
Variance	1.09185e+28	3.75002e+19	9.26988e+08	3.44058e+08	9.12008e+08	0.666667	0.666667
Kurtosis	--	--	-1.50001	-1.49995	-1.5	-1.50001	-1.50001
Skewness	--	0.506902	0.481551	0.700794	-0.702293	1.75201e-06	1.75201e-06

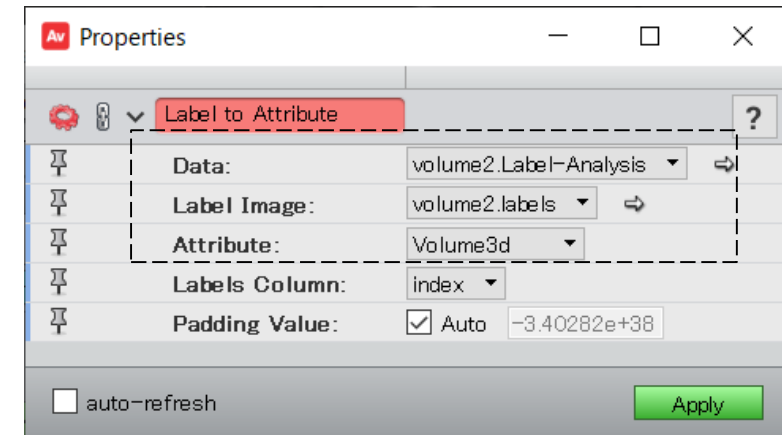
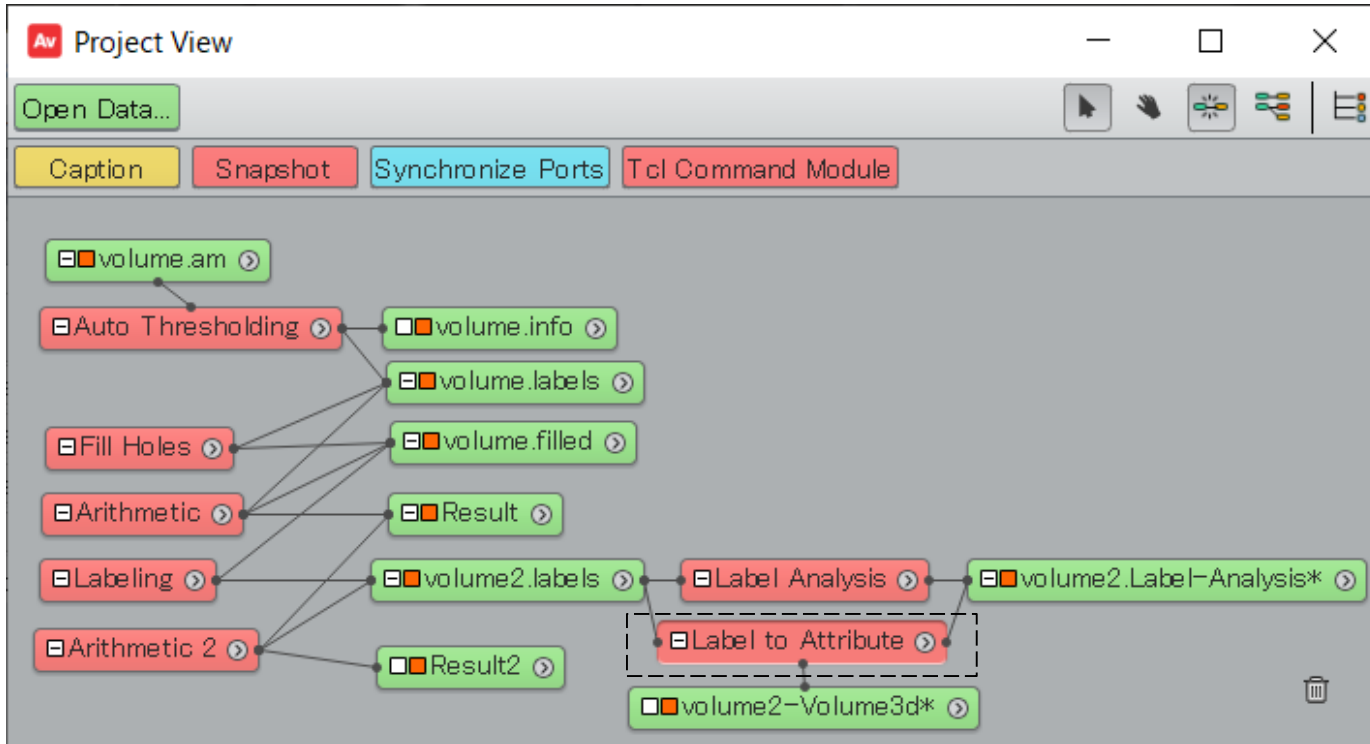
	Volume3d (μm^3)	Area3d (μm^2)	BaryCenterX (μm)	BaryCenterY (μm)	BaryCenterZ (μm)	Mean	index
1	3.01867e+14	2.18408e+10	47326.9	43853.7	36246.8	1.0	1
2	1.10691e+14	1.11852e+10	99420.7	84174.4	98822.0	2.0	2
3	5.8895e+13	7.37006e+09	27155.5	45877.2	101700.1	3.0	3

Input: volume2.labels

Output: volume2.Label-Analysis

8. Label to Attribute

Attach “Label to Attribute” module => click “Apply”: creates a volume filled with label measures



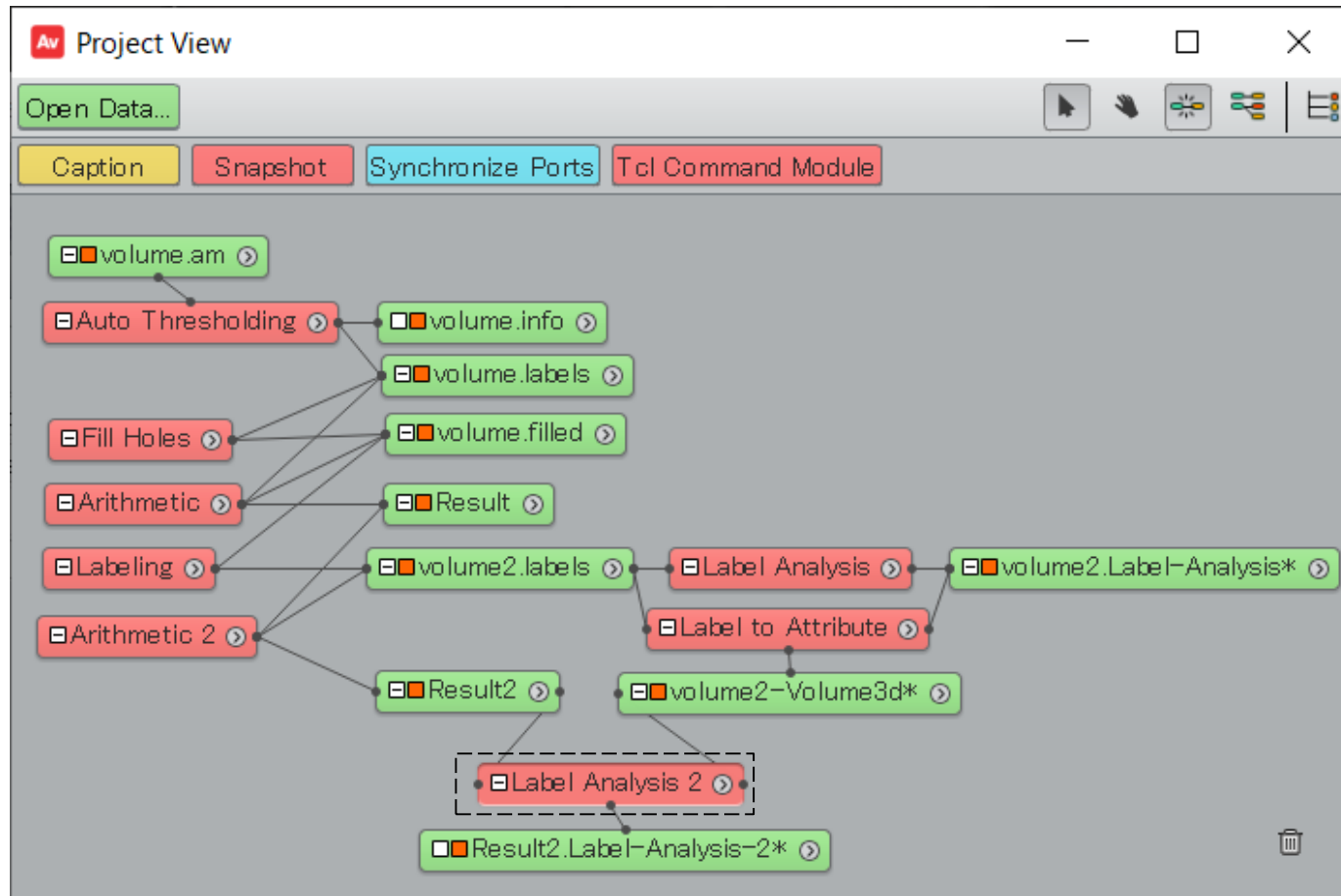
Input: volume2.labels

Output: volume2-Volume3d

Input: volume2.Label-Analysis

9. Label Analysis

Attach “Label Analysis” module => click “Apply”: get the numeric data of label



Input: Result2

Input: volume2-Volume3d

Output: Result2.Label-Analysis-2

Properties

Label Analysis 2

Data: Result2

Intensity Image: volume2-Volume3d

Interpretation: ☒ 3D ☐ XY planes

Measures: basic

☐ auto-refresh **Apply**

Tables

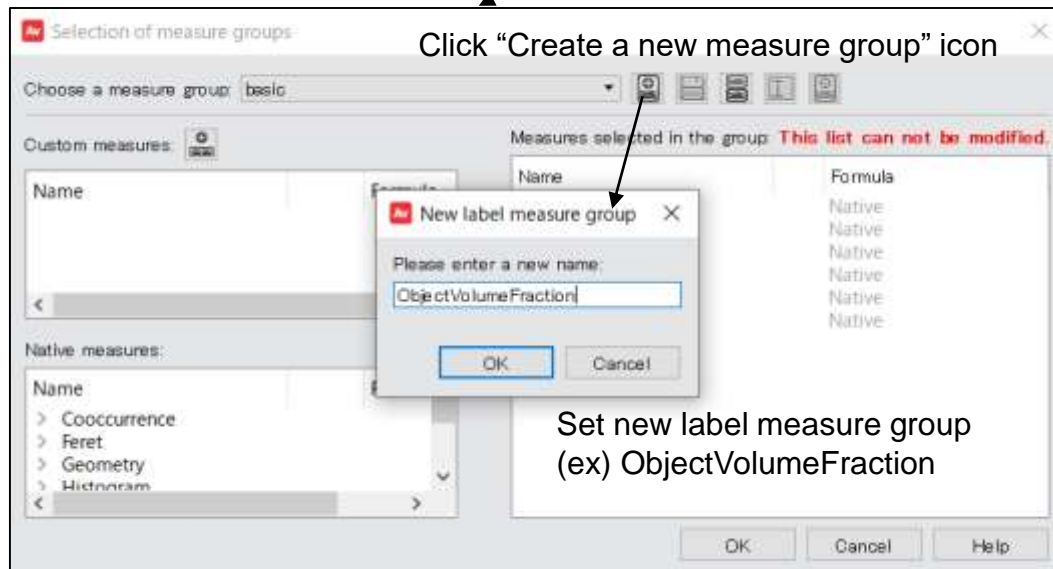
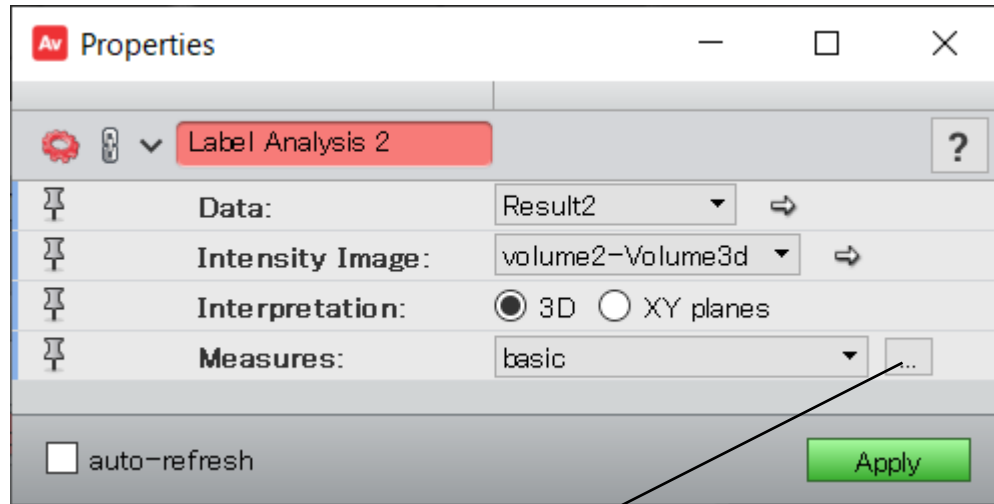
Result2.Label-Analysis-2

	Volume3d (μm ³)	Area3d (μm ²)	BaryCenterX (μm)	BaryCenterY (μm)	BaryCenterZ (μm)	Mean	index
Mean	8.16e+12	7.64141e+09	58169.3	57427.5	79261.3	1.57151e+23	2.0
Min	2.408e+12	2.1554e+09	31024.9	43993.2	37799.9	5.8895e+22	1.0
Max	1.639e+13	1.54073e+10	95895.5	83285.1	102336.8	3.01867e+23	3.0
Median	2.408e+12	2.1554e+09	31024.9	45004.2	102336.8	5.8895e+22	3.0
Variance	3.5653e+25	3.18678e+19	7.57351e+08	3.34479e+08	8.63191e+08	inf	0.666667
Kurtosis	--	--	-1.50001	-1.49998	-1.50001	--	-1.50001
Skewness	inf	0.539929	0.519919	0.70549	-0.693619	--	1.75201e-06

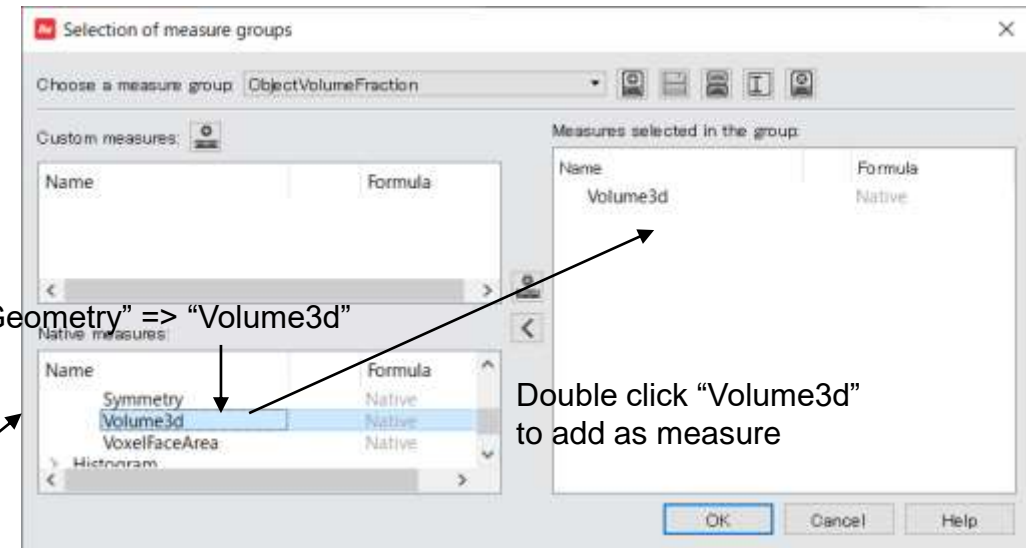
	Volume3d (μm ³)	Area3d (μm ²)	BaryCenterX (μm)	BaryCenterY (μm)	BaryCenterZ (μm)	Mean	index
1	1.639e+13	1.54073e+10	47587.6	43993.2	37799.9	3.01867e+23	1
2	5.682e+12	5.36151e+09	95895.5	83285.1	97647.3	1.10691e+23	2
3	2.408e+12	2.1554e+09	31024.9	45004.2	102336.8	5.8895e+22	3

Customize “Measures:” => see next page
*calculate a relative fraction

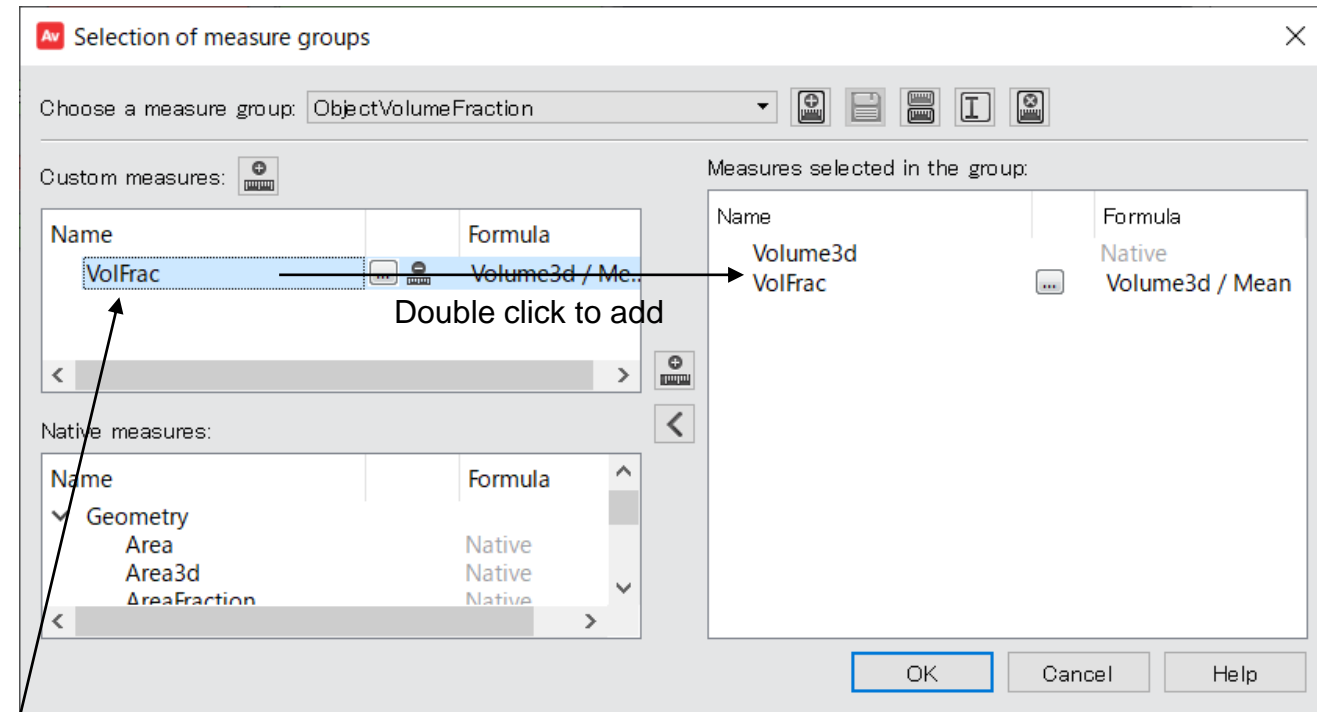
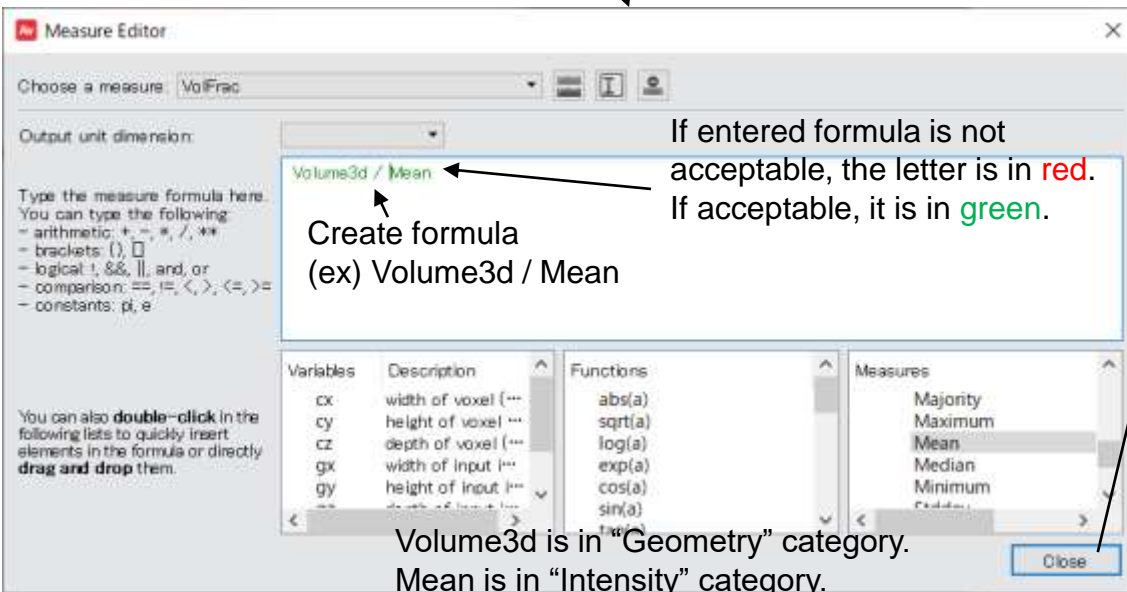
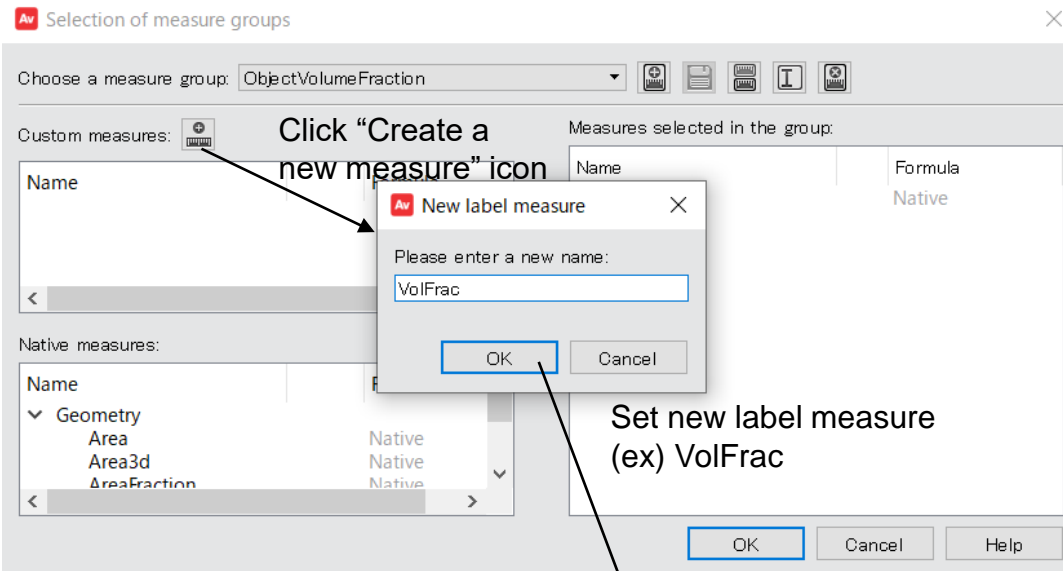
9. Label Analysis – Customize table



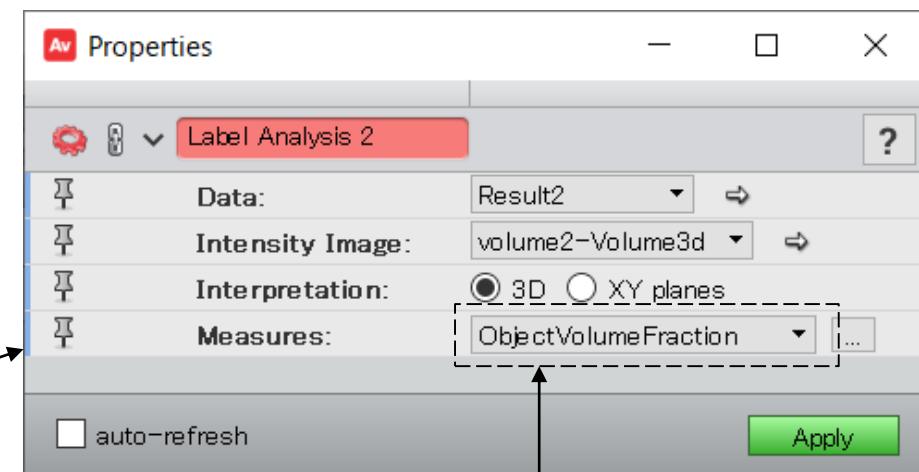
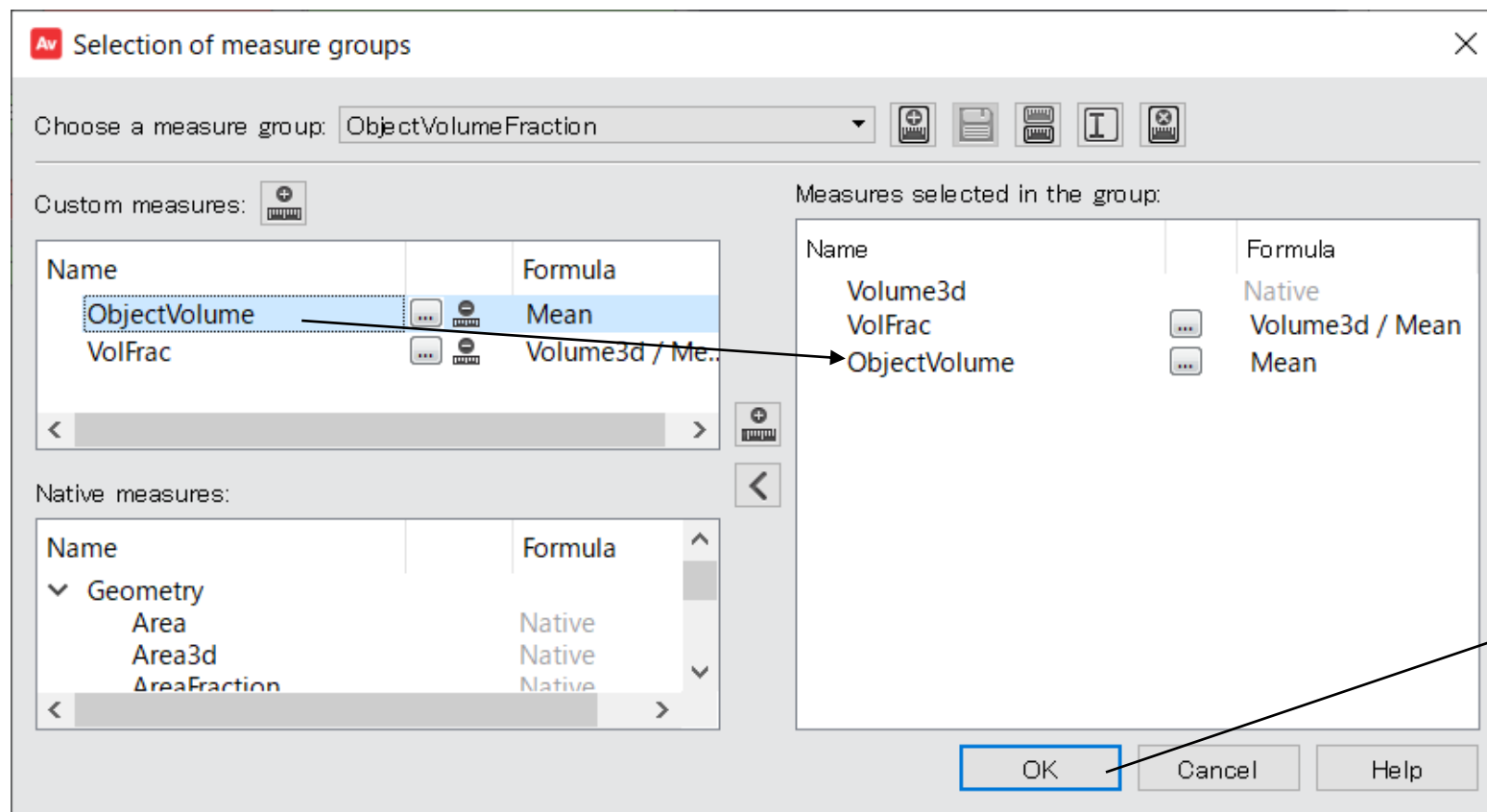
Search "Geometry" => "Volume3d"



9. Label Analysis – Customize table



9. Label Analysis – Customize table



New measure item added.
Click "Apply"

Create "ObjectVolume" that will replace Mean with ObjectVolume for better understanding.

9. Label Analysis – Customize table

The screenshot displays the Avizo software interface with a workflow graph on the left and a table of analysis results on the right. The workflow graph shows a sequence of steps: 'volume.am' leads to 'Auto Thresholding', which leads to 'volume.info', 'volume.labels', and 'volume.filled'. 'volume.labels' leads to 'Labeling', which leads to 'volume2.labels'. 'volume2.labels' leads to 'Label Analysis', which leads to 'volume2.Label-Analysis*'. 'volume2.Label-Analysis*' leads to 'Label to Attribute', which leads to 'Result2'. 'Result2' leads to 'Label Analysis 2', which leads to 'Result2.Label-Analysis-2*'. The 'Properties' panel at the bottom shows the selected object 'Result2.Label-Analysis-2' with a 'Data Class' of 'HxLabelAnalysis', a 'Master' of 'Label Analysis 2', and a 'Table' button. The 'Tables' panel on the right shows a table titled 'Result2.Label-Analysis-2' with columns: 'Volume3d (μm^3)', 'VolFrac', 'ObjectVolume', and 'index'. The table contains three rows of data. A text box with a black border and white background is overlaid on the table, containing the text: 'Table show a volume fraction for each object'.

Avizo - Avizo_PoreFraction_EachGrains.hx

File Edit Project View Window XPanel Python XScreen Help

START PROJECT RECIPES SEGMENTATION MESHING FILAMENT ANIMATION

Project View

Open Data...

Label to Attribute Clear History Log Create Recipe Analysis Filter

volume.am

Auto Thresholding

volume.info

volume.labels

volume.filled

Fill Holes

Arithmetic

Result

Labeling

volume2.labels

Label Analysis

volume2.Label-Analysis*

Label to Attribute

Result2

volume2-Volume3d*

Label Analysis 2

Result2.Label-Analysis-2*

Properties

Result2.Label-Analysis-2

Data Class: HxLabelAnalysis

Master: Label Analysis 2

Table: Show

auto-refresh

Apply

Ready

Tables

Result2.Label-Analysis-2

	Volume3d (μm^3)	VolFrac	ObjectVolume	index
Mean	8.16e+12	0.0488379	1.57151e+23	2.0
Min	2.408e+12	0.0408863	5.8895e+22	1.0
Max	1.639e+13	0.0542954	3.01867e+23	3.0
Median	2.408e+12	0.0408863	5.8895e+22	3.0
Variance	3.5653e+25	3.30777e-05	inf	0.666667
Kurtosis	--	-1.50194	--	-1.50001
Skewness	inf	-0.568848	--	1.75201e-06

	Volume3d (μm^3)	VolFrac	ObjectVolume	index
1	1.639e+13	0.0542954	3.01867e+23	1
2	5.682e+12	0.0513321	1.10691e+23	2
3	2.408e+12	0.0408863	5.8895e+22	3

Table show a volume fraction for each object

Avizo™

Stop

MEMORY USAGE 12%

Thank you!

Find out more at:
Amira-Avizo.com