

Application Note #28

How to create : «XYZ matrix of sub-volumes»

The application-note purpose is to guide the user in creating a sampling volume (ROI) as a XYZ matrix of boxes. The application uses a Python script to create single or contiguous sub-regions that can be used as ROI for further analysis. The unique limits is related to the sampling volume shape, only regular 3D boxes are available.

Application Flowchart

Python Script (sub-regions creation)

- The Python script creates the contiguous sub-regions (sampling volume) in the dataset volume.

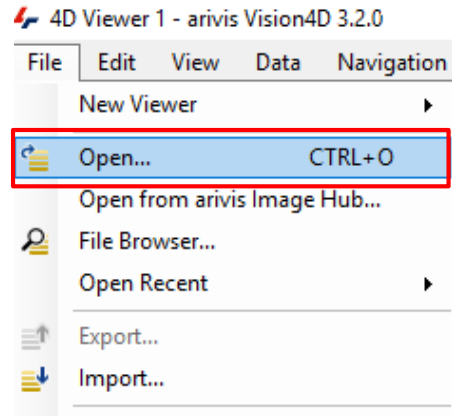
Index

1. Open the working dataset
2. Load the Python Script
3. Set the Script features
4. Run the Python Script

1. Open the working dataset on Vision4D

Step 1.1

Select the *Open...* item from the file menu.

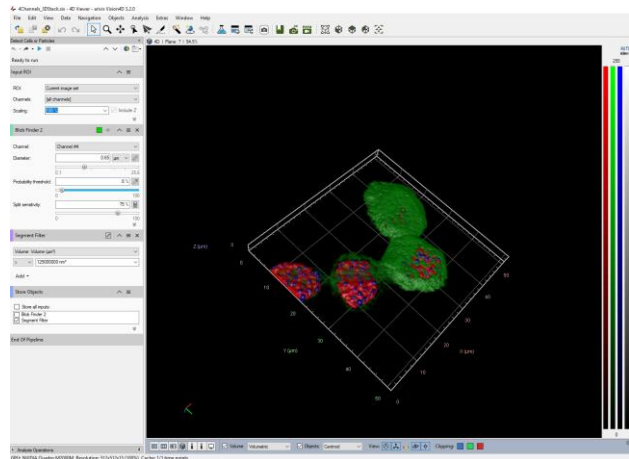


Step 1.2

Select the dataset from the file browser.

TIPS :

The dataset is visualized according to the current rendering setting parameters. Please refer to the (arivis Vision4D Help) for more details



DETAILS:

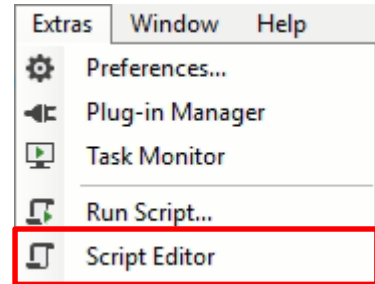
The dataset is a multi dimensional, discrete, representation of your real sample volume. It can be structured as a Z series of planes (Optical sectioning) of multiple channels (dyes) in a temporal sequence of time points (located in several spatial positions).

Usually the dataset shows a single experimental situation (a complete experiment can be composed by several datasets). The datasets are available as graphic files saved in plenty of file formats (standard formats as well as proprietary formats)

2. Load the Python Script

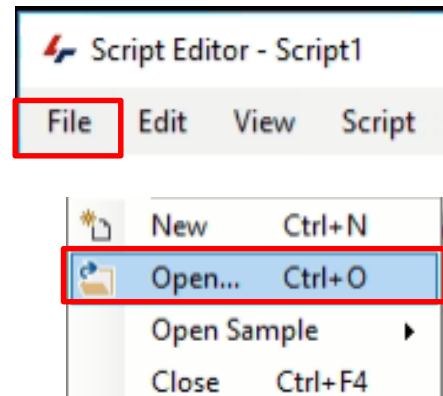
Step 2.1

Open Python Script Editor.
From the «*Extra*» menu, select the
«*Script Editor*» item



Step 2.2

Load the “*Divide_Scope_RevG (3_4)*”
Python Script.
Browse the folder on which the file
has been saved



Python script code usage rights.

```
#  
# NAME: Divide Scope  
# FILE: Divide_Scope_RevG (3_4)  
# REVISION : 1.2.0 - 20/07/2021  
# AUTHOR : Maurizio Abbate  
# Copyright(c) 2021 arivis AG, Germany. All Rights Reserved.  
#  
# Permission is granted to use, modify and distribute this code,  
# as long as this copyright notice remains part of the code.  
#  
# PURPOSE : the whole volume is divided in contiguous boxes  
#           the segments volume are divided in contiguous boxes  
#  
# PARAMETERS: f TAG_SEGMENTS is set, the boxes are created inside the segments  
#              bounds (each object is divided in boxes)  
#              TAG_SEGMENTS == "" the whole Imageset volume is used to compute  
#              the boxes  
#              TAG_BOXES sets the output boxes TAG  
#              TAG_BOXES == "" - the default tag "Script" is used  
#              PRESERVE_EDGES = True -> the boxes edges are not overlapped  
#  
# NOTE: Keep the object visualization OFF and the objects table closed during the script  
#       run  
# Tested For V4d Release : 3.4  
#
```

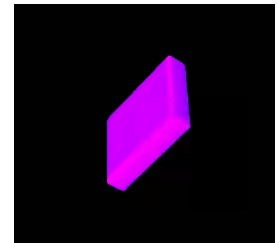
The user has the permission to use, modify and distribute this code, as long as this copyright notice remains part of the code itself.

Copyright(c) 2021 arivis AG, Germany. All Rights Reserved.

3. Set the Script features

In order to define the contiguous sub-regions (sampling volume) features, few parameters of the script should be adjusted to match your analysis needs. These parameters are located in the code area labeled as “**USER SETTING**”

```
#  
# Size of each box  
# SIZE_BOX_X,SIZE_BOX_Y,SIZE_BOX_Z expressed in um  
#  
SIZE_BOX_X = 2000.0  
SIZE_BOX_Y = 2000.0  
SIZE_BOX_Z = 700.0  
#  
#
```



Step 3.1

SIZE_BOX_X = the X axis size of each box . The value is expressed in um.

SIZE_BOX_Y = the Y axis size of each box . The value is expressed in um.

SIZE_BOX_Z = the Z axis size of each box . The value is expressed in um.

```
# -----  
# OPTION PRESERVE_EDGES = the boxes edges are not overlapped  
# -----  
PRESERVE_EDGES = True  
# -----
```

Step 3.2

PRESERVE_EDGES = the option set the boxes touching / non touching feature. If **TRUE**, the boxes edges are not contiguous each others (2 pixels space in between)

NOTE :

The volume sizes (XYZ) are divided by the single box XYZ size. The integer number of boxes fitting in the volume is computed. It may happen that the boxes doesn't cover the whole sample volume.

NOTE :

Only the parameters located in the “**USER SETTING**” area can be modified. Don't change any other number, definition or text in the code outside this dedicated area.

3. Set the Script features (continue)

```
# -----  
# TAG used to get the segment bounding box - options  
# Upper/ Lower case sensitive  
# -----  
#  
TAG_SEGMENTS = "Manual"           # Manual  
TAG_BOXES = "Heatmap"             #  
#
```

Step 3.3

TAG_SEGMENTS = defines the segments TAG to be used to compute the boxes. It is used as alternative of the standard method (whole volume) If empty, the default method (whole volume) is used.

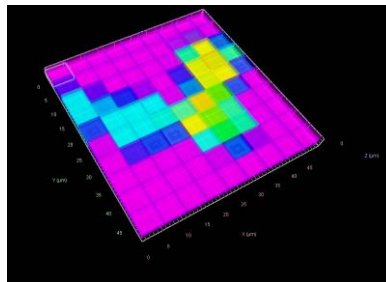
```
TAG_SEGMENTS = ""
```

Step 3.4

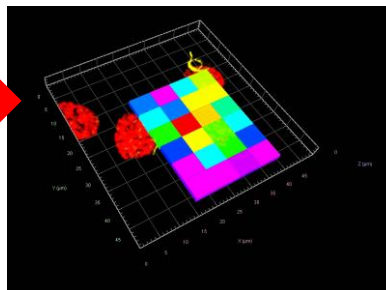
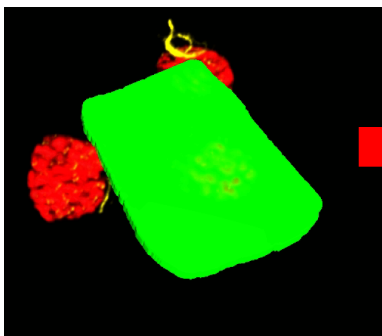
TAG_BOXES = defines the TAG assigned to the created boxes

```
TAG_BOXES = "Boxes"
```

TAG_SEGMENTS = ""



TAG_SEGMENTS = "Manual"



NOTE :

If the **TAG_SEGMENTS** is set to an existing TAG, all the objects belonging to it are used to create the boxes matrix. Specifically, the bounding box volume of each object is taking as the reference volume that is divided into boxes.

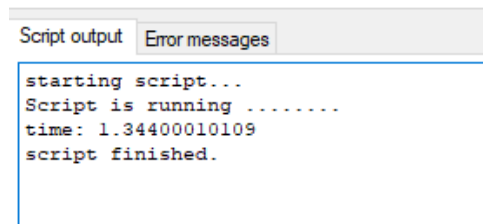
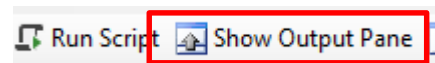
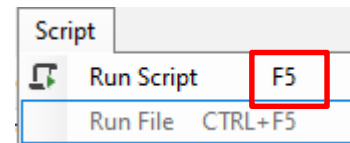
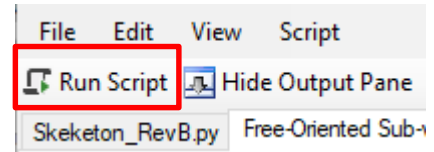
4. Run the Python Script

Step 4.1

Run the “*Divide_Scope*” Python Script pressing the “Run Script” button or pressing the F5 key.

TIPS :

Activate, if not already displayed, the “Output Panel”. The status of the script execution (errors including) will be visualized here





Contact the arivis local area sales manager to get more information about how to get the python script mentioned here.

Contact the arivis application support to receive additional technical details about the topic described in the application note, or how to adapt the application workflow to your requirements.

“The quantitative analysis of the images represents the art of transforming a visual sensation into its schematic and discrete form allowing its univocal description, classification and mathematical and logical interpretation of its spatial and temporal components”

arivis AG, Am Kabutzenhof 21,
18057 Rostock, Germany

Email : support@arivis.com