

Description of the data structure

Five data structures to store every computed information : Main dictionary describes each data frame, with the computed geometrical information and segmentation. Masks list links individual segmented masks to their appropriate frame. ROI dict describes cell lineages, and Masks ROI list links individual segmented masks to their appropriate ROI. To simplify the height profile analysis, each ROI has a designated folder (in the folder 'cells') with tracked features and height profiles.

Main dictionary : str (frame name) : str (property) : obj. List of properties for each frame :

- 'time' (int) : time after the 1st frame
- 'adress' (str) : path from project root to the images (see data files)
- 'masks' np [[int32]] : labelled masks, background is 0
- 'masks error' (bool) : error in mask detection in the frame
- 'outlines' np [[coords i, coords j]] : list of the outlines of the masks, ordered by masks labels (first element is the outline of the mask 1)
- 'angle' (float) : rotation angle of the images in radian (0 in our case)
- 'centroid' np[(int32 i, int32 j)] : list of the barycenters of the masks, ordered by masks labels
- 'area' np [int32] : pixel area of each masks, ordered by masks labels
- 'main centroid' np [int32 i, int32 j] : main centroid coordinates
- 'parent' (str) : previous frame without error, can be ""
- 'child' (str) : next frame without error, can be ""
- 'masks list' [int] : label of each mask in the whole dataset (see mask number in masks list)

ROI dict : str (ROI name) :str (property) : obj. List of properties of every cell lineage (ROI):

- 'Parent' (str) : name of the parent ROI
- 'Children' [str] : list of name of the children ROI, can be empty and has 2 elem max
- 'Mask IDs' [int] : list of the mask numbers (see masks list) of the masks composing the ROI, ordered in time
- 'index' (str, 'int/0,1+') : biological index of the ROI
- 'color index' (int) : used for the plots

Masks list (inverse function of the main dictionary) np object array (n by 4): mask number 7→ [mask number (int), dataset name (str), frame name (str), label of the mask in the frame (int)] nb : mask of index i has the number i+1 in the array 'masks'

Masks ROI list (inverse function of the ROI dictionary) np object array (n by 3): mask number 7→[color index (int), 'index' (str, 'int/0,1+'), ROI name (str)]

ROI folder : contains height profiles (lines) for each frame of the generation and the tracking of the morphological features (similar to ROI list and ROI dict)

Data files : log files for the microscope raw data, .npz files for the other files.