`Kippi.exe` : User manual

This document provides instructions for running the executable `Kippi.exe`, which comes as supplementary material for the paper "KIPPI : KInetic Polygonal Partition of Images" (CVPR '18).

Input

Launching `Kippi.exe` opens a user interface. In the top right corner of this interface, the user can notice two buttons : "Open an input image" and "Save partition". By releasing the button "Open an input image", the user is requested to feed the algorithm with an image to process. The most common image formats (PNG, JPG, TIFF, BMP) are supported. If the selected image can be opened, then it will automatically be displayed in the central panel of the interface, on which the user can zoom in or out using the scroll wheel of a computer mouse.

Shape detection

As explained in the aforementioned paper, the first step of the partitioning algorithm consists in running the Line-Segment Detector (LSD) of Grompone et al. to detect areas of high contrast in the image. We use the LSD scale parameter to control the quantity of lines output by the LSD. In this interface, we provide a horizontal slider inside the widget "Shape detection" that allows the user to tune this parameter and control the number of cells of the final partititon.

Partitioning options

Below the widget "Shape detection", one can find another widget named "Partitioning options" listing the different options that are left to the user :

1. "Regularize segments" : one can apply the regularization procedure described at the section 3 of the paper, that consists in perturbating initial line-segments to favor geometric relationships between them, by clicking on this checkbox. It is recommended to run this process when the input image shows man-made structures without perspective effects.
2. "Number of intersections" : here, the user sets the parameter K in the section 4.2 of the paper, that determines if a primitive of our kinetic scheme should stop propagating when it collides another primitive. By default, K is set to 1.
3. "Merge thin cells" : this function removes the thinnest cells from the partition by merging them with their neighbors, upon condition that the resulting cells are still convex.

The button "Generate partition" computes a new partition with the specified options and refreshes the view once it is done.

Views

In the bottom left corner of this corner, we provide a set of checkboxes that offer the user different ways to appreciate the generated results. In particular, we let him/her superpose a colored tesselation over the result, with one color per cell : please modify the alpha value of the background image to visualize it.

If requested, the user can also visualize the set of line-segments initially output by the LSD, or the set of line-segments after the regularization process, by clicking on the appropriate checkboxes. Please note that these segments may be overlapped by the resulting partition : the interface user may need to hide it, by disabling the checkbox "Display partition", to observe the line-segments.

Finally, it is also possible to bolden the different elements of the view (line-segments and partition) by tuning the value "Line width", at the bottom of the widget.

Output

Back to the top right corner of the image. The button "Save partition" offers the user the opposibility to keep a trace of his/her work if it is satisfying enough. The user will then be requested to select a folder for saving the different outputs, which will be themselves stored in a generated subfolder (named after the image, and the current date).

The different outputs are all named after the input image `I`. There are four outputs in total :

1. `I.txt` represents the underlying graph of the partition. It comprises : i) two integers representing the size of the image `I`, ii) the number of vertices, edges and cells of the partition, iii) a list of vertices with their 2D coordinates, iv) a list of edges, defined through the indices of their delimiting vertices, v) a list of cells, each cell being defined as a sequence of half-edges.
2. `I_labels.txt` assigns cell indices to all pixels of the input image. They are listed in a row-major format.
3. `I_partition.bmp` and `I_partition.svg` are visual representations of the generated partition over the input image. The SVG file should be opened using an adapted software, for instance Inkscape 0.91.