Connect component Labelling Exercise

January 27, 2020

Exercise 1

1.1. Given the source code provided in the exercise. you need first to implement the class `Adjacency8` on the file `adjacency.py`.

1.2. Code the function `label` which receives a binary image `f` and returns an image that each pixel has the value of its connected component label. The background pixels have value zero and then each connected component has as label a value from 2 up to $n+1$, where n is the number of connected components. For this, your algorithm receives a binary image $f : D_f \rightarrow \{0, 1\}$ and an adjacency relation $\mathcal{A}$ and follows the steps below:

1. For each foreground pixel $f(p) = 1, p \in D_f$, create a set P of sets of unity pixels.
2. For each pair of adjacent foreground pixels $p, q \in \mathcal{A}(D_f)$, union the sets $P \cup Q$ such that $p \in P$ and $q \in Q$.
3. Label (a number between 2 and $n + 1$) each different set assigning each pixel with the label of the set it is contained.

You have to code this algorithm in function `label` (in file `labeling.py`). At the end of function `label`, you should return the image containing the labels.