Python Advanced Course

List 9.

For the lab, you must complete one of the following tasks. Each task is worth 5 points.

Task 1.

Using the matplotlib library, program your own snake: first, arrange random squares on the plot, then program an animated snake that will randomly wander around the plot. The fun ends when the snake's head hits its own tail or one of the squares. It can be assumed that the number of snake segments is set by a global variable.

Task 2.

The Game of Life is an example of a cellular automaton invented by John Conway. The rules of operation are described, among others, in Wikipedia (https://pl.wikipedia.org/wiki/Gra_w_%C5%BCycie). Using the matplotlib package, program a simulation of such an automaton.

Although the game of life is played on an infinite board, you can assume some reasonable constraints. The initial state can be fixed or random.

Task 3.

Another type of cellular automaton is Langton's ant (https://pl.wikipedia.org/wiki/Mr%C3%B3wka_Langtona). Program a simulation of such an automaton in matplotlib.

Task 4.

Program a set of functions that modify a given image so that the modification is

- significantly happier, i.e. it had less gray (i.e. the color that satisfies the condition R ÿ G ÿ B). Propose some strategy for indicating the substitute color based on the colors around gray areas;
- significantly sadder, adding more grey to the original image.

Show the original and modified image on one graph. For those interested: instead of two images, you can make an animation of the gradual transition of the original image to the target one.

Task 5.

Program a function that will construct an image containing only the outline of objects or people in the image for a given image. The proposed strategy is as follows: we search for the boundary between the object and the background or other objects by looking for significant color changes between neighboring pixels.

Propose at least two implementations of significant color change between pixels. Present the results on one graph (i.e. the original image and outlines obtained by different methods).

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