

Advanced Python: Homework set 10

2023/2024

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

Problem 1

Using the matplotlib library, program your own snake: first arrange random squares on the graph, and then program an animated snake that will randomly roam the graph. The fun ends when the snake's headstumbles upon its own tail or one of the squares.

Problem 2

The Game of Life is an example of a cellular automaton invented by John Conway. The operating rules are described, among others: on Wikipedia (https://en.wikipedia.org/wiki/Conway%27s_Game_of_Life). Using the matplotlib package program a simulation of such an automaton. It's true that the game of life takes place on an infinite board, but you can accept some reasonable restrictions. The initial state may be fixed or random.

Problem 3

Another type of cellular automaton is Langton's ant (https://en.wikipedia.org/wiki/Langton%27s_ant). Program in matplotlib simulation of such an automaton.

Problem 4

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

- significantly happier, i.e. it had less gray color (i.e. the color fulfilling condition $R \approx G \approx B$). Suggest some color cueing strategy placeholder based on colors around gray areas;
- significantly sadder, adding more gray to the original image.

Show the original and modified image in one chart. For those interested: instead of two images, you can create an animation of a gradual image transition primary to target.

Problem 5

Program a function that will construct an image containing the outline of objects or people in the given image. The proposed strategy is as follows: we look for the boundary between the object and the background or other objects, looking for significant color changes between adjacent pixels. Suggest at least two implementations of a significant color change between pixels. Present the results in one graph (i.e. the original image and contours obtained by various methods).