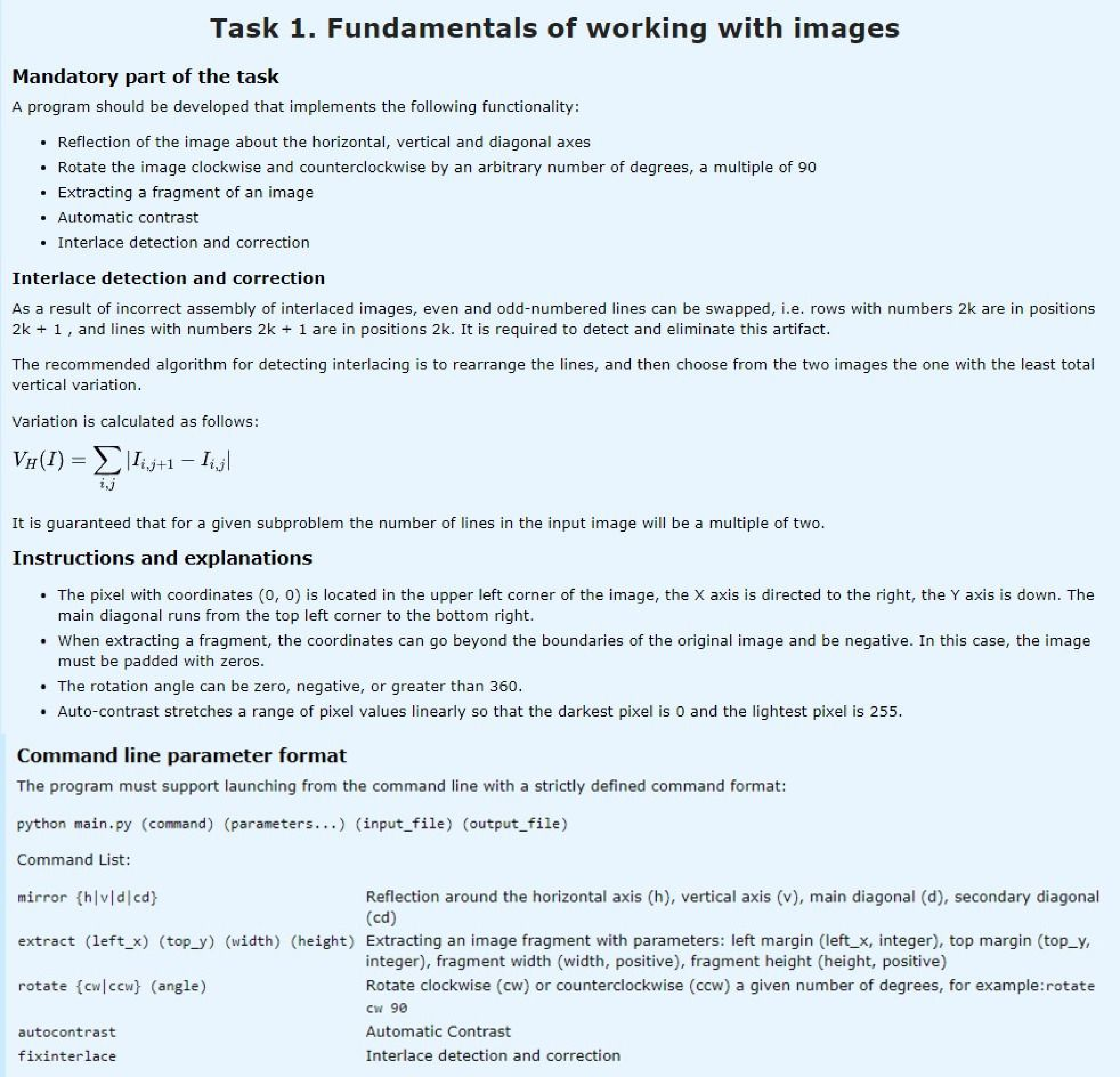

Task 1. Fundamentals of working with images

Mandatory part of the task

A program should be developed that implements the following functionality:

- Reflection of the image about the horizontal, vertical and diagonal axes
- Rotate the image clockwise and counterclockwise by an arbitrary number of degrees, a multiple of 90
- Extracting a fragment of an image
- Automatic contrast
- Interlace detection and correction

Interlace detection and correction

As a result of incorrect assembly of interlaced images, even and odd-numbered lines can be swapped, i.e. rows with numbers 2k are in positions 2k + 1 , and lines with numbers 2k + 1 are in positions 2k. It is required to detect and eliminate this artifact.

The recommended algorithm for detecting interlacing is to rearrange the lines, and then choose from the two images the one with the least total vertical variation.

Variation is calculated as follows:

$$V_H(I) = \sum_{i,j} |I_{i,j+1} - I_{i,j}|$$

It is guaranteed that for a given subproblem the number of lines in the input image will be a multiple of two.

Instructions and explanations

- The pixel with coordinates (0, 0) is located in the upper left corner of the image, the X axis is directed to the right, the Y axis is down. The main diagonal runs from the top left corner to the bottom right.
- When extracting a fragment, the coordinates can go beyond the boundaries of the original image and be negative. In this case, the image must be padded with zeros.
- The rotation angle can be zero, negative, or greater than 360.
- Auto-contrast stretches a range of pixel values linearly so that the darkest pixel is 0 and the lightest pixel is 255.

Command line parameter format

The program must support launching from the command line with a strictly defined command format:

```
python main.py (command) (parameters...) (input_file) (output_file)
```

Command List:

`mirror {h|v|d|cd}`	Reflection around the horizontal axis (h), vertical axis (v), main diagonal (d), secondary diagonal (cd)
`extract (left_x) (top_y) (width) (height)`	Extracting an image fragment with parameters: left margin (left_x, integer), top margin (top_y, integer), fragment width (width, positive), fragment height (height, positive)
`rotate {cw|ccw} (angle)`	Rotate clockwise (cw) or counterclockwise (ccw) a given number of degrees, for example:`rotate cw 90`
`autocontrast`	Automatic Contrast
`fixinterlace`	Interlace detection and correction