



COMPUTER VISION

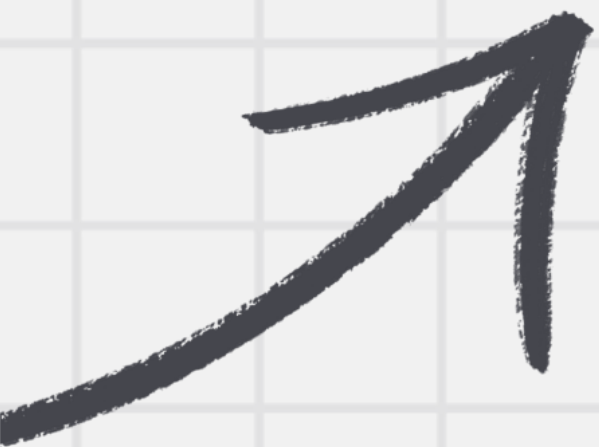
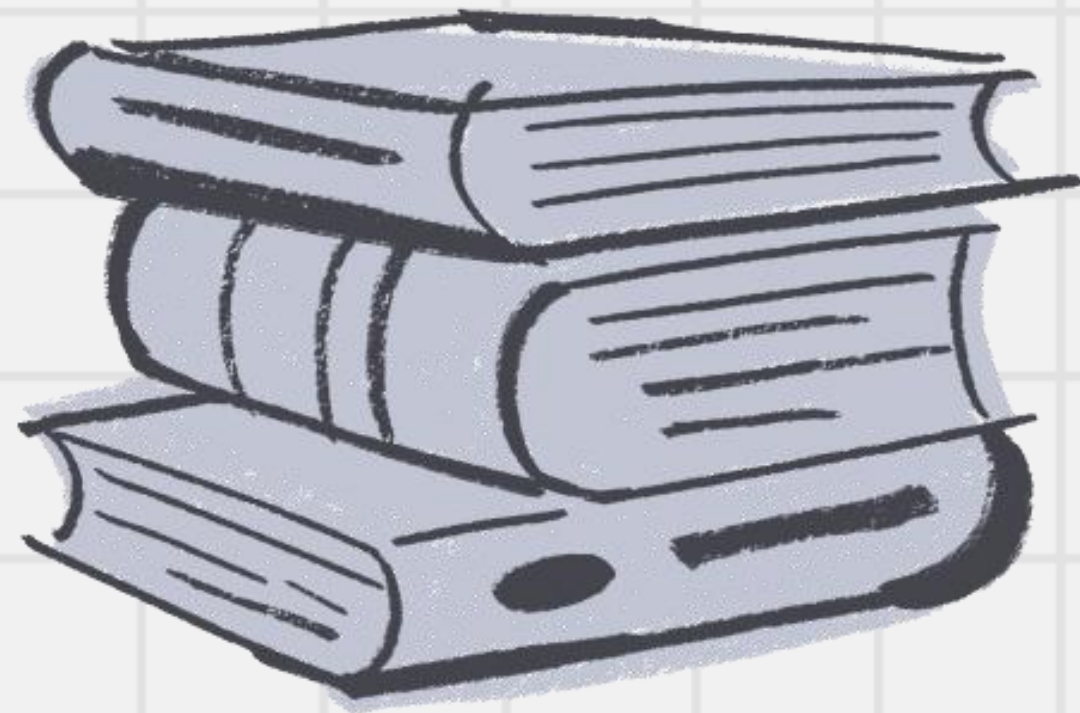


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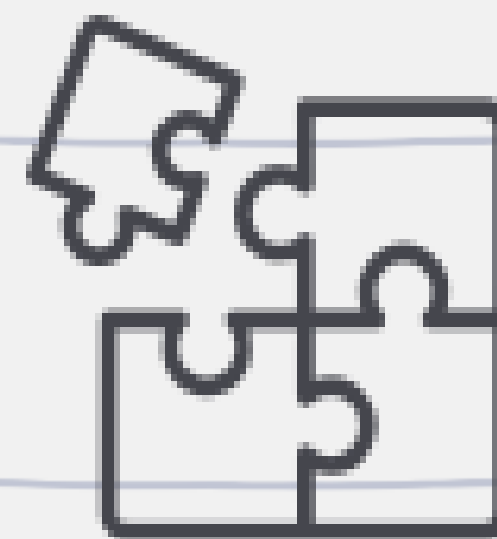
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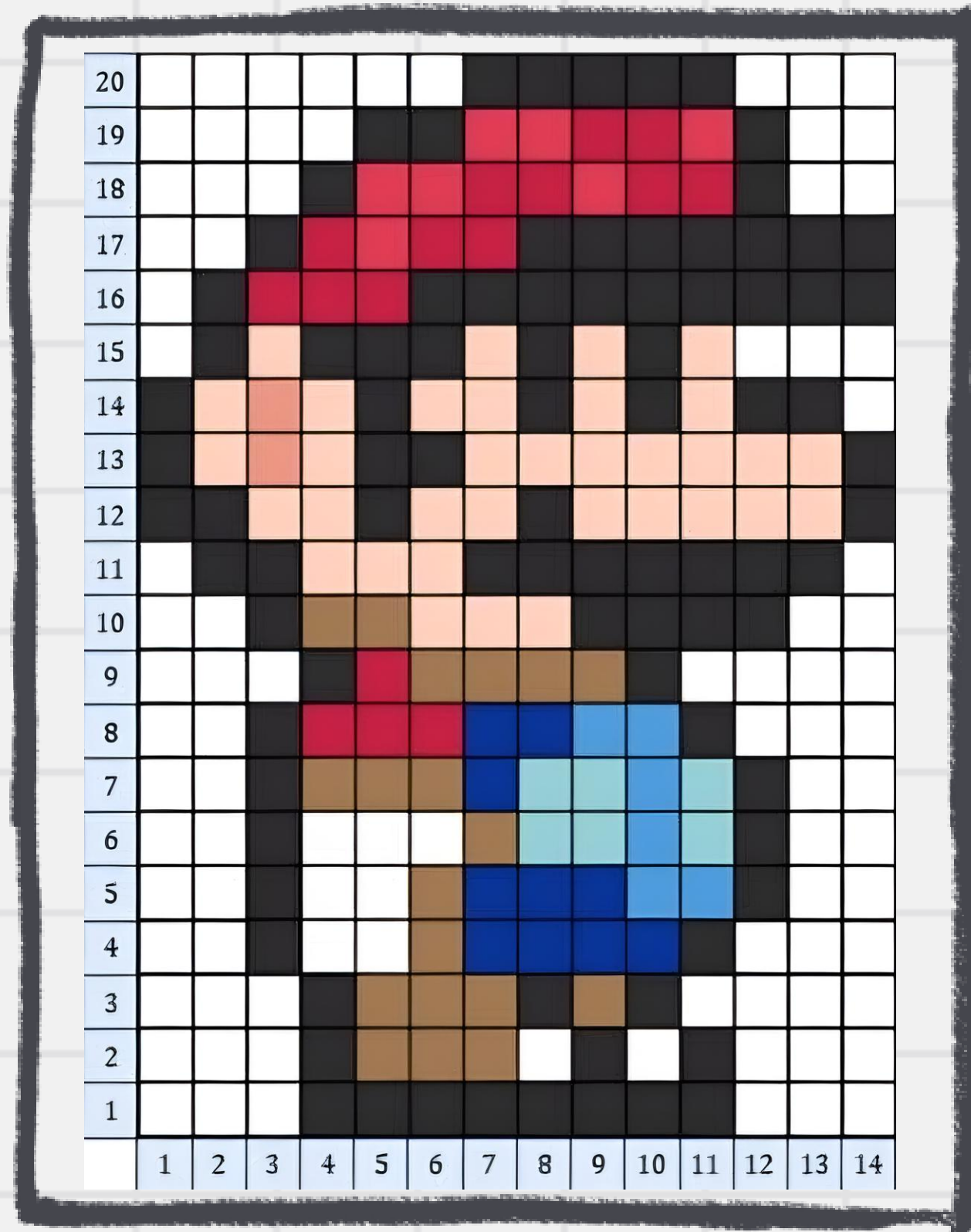


01



Image

What is image



An image is a structured representation of a scene stored as a 2D array (matrix) of pixel values. Each pixel, the smallest unit of an image, contains color or intensity information and is uniquely indexed by its position along the X-axis (width) and Y-axis (height) in the coordinate system. Pixels are arranged in a grid, and their values collectively define the image's appearance.

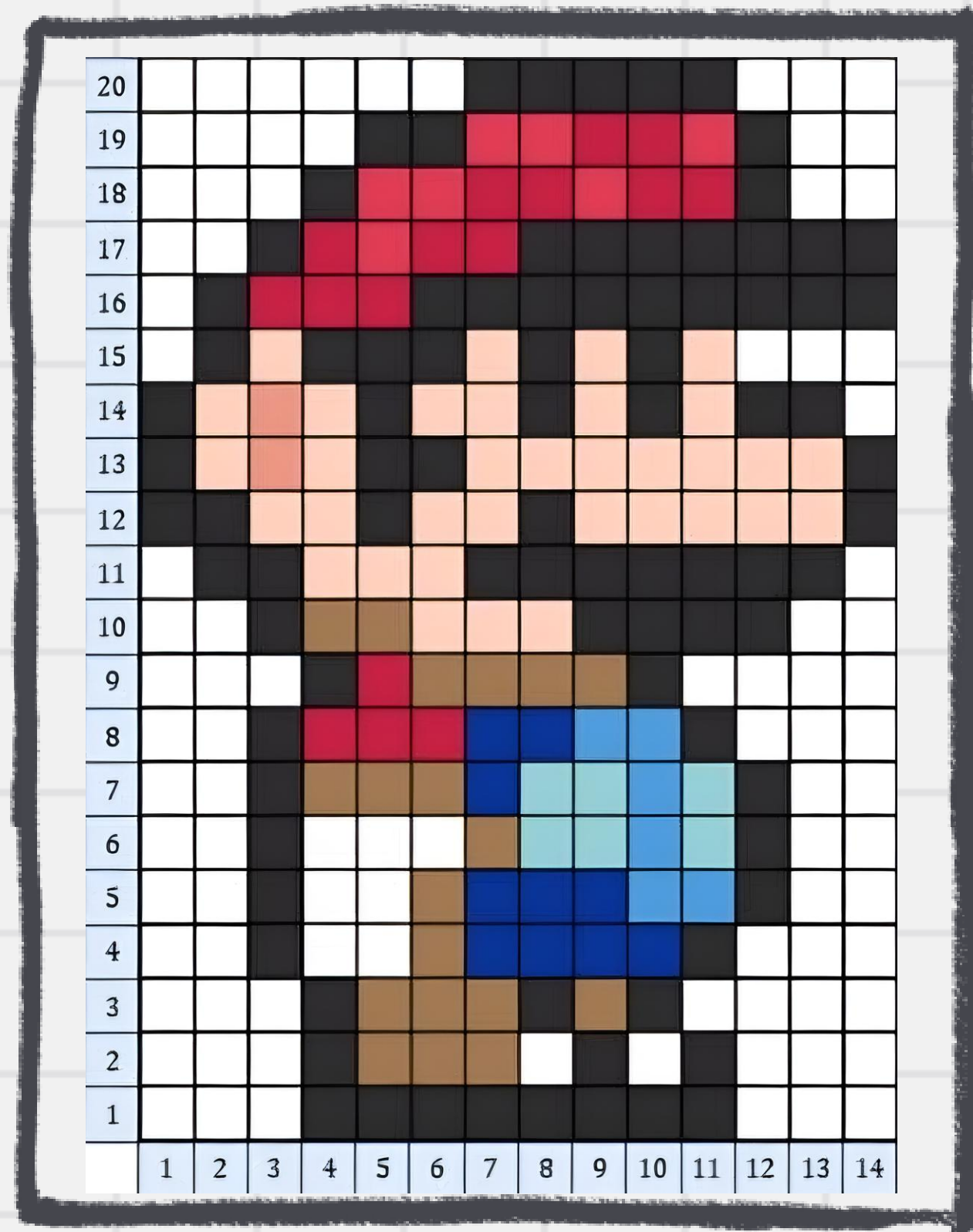


02



Geometric Transformations

Geometric Transformations

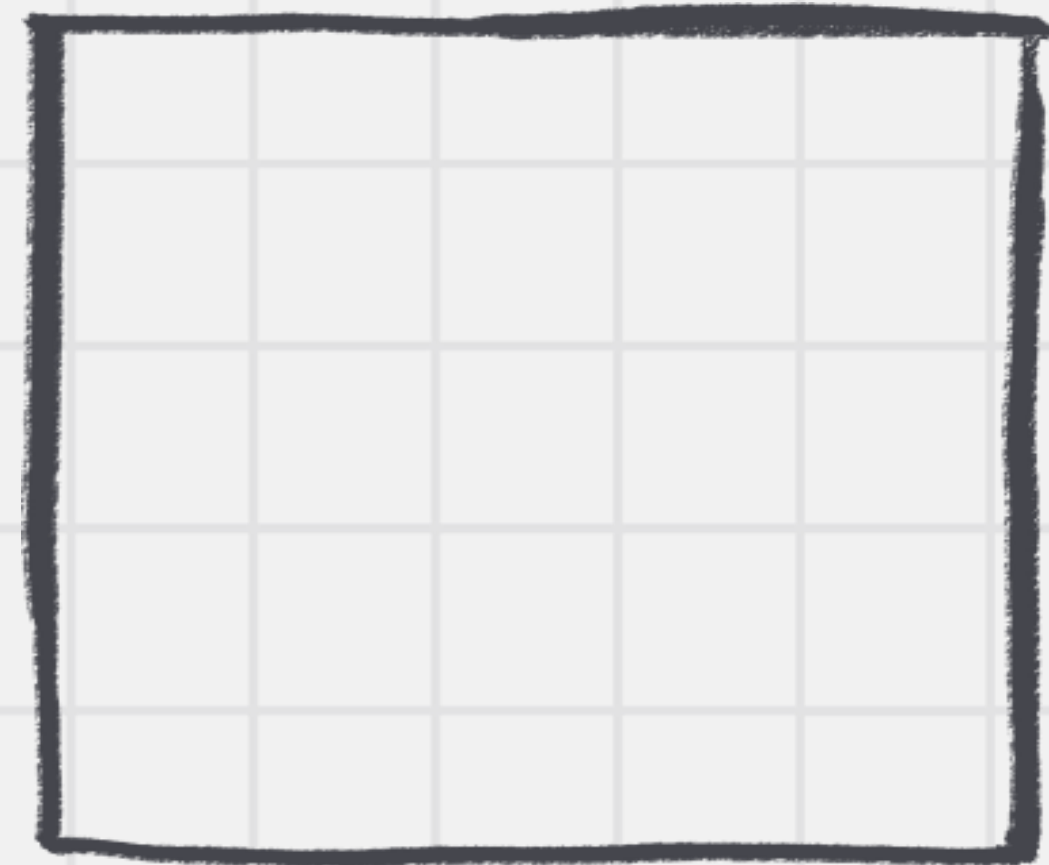
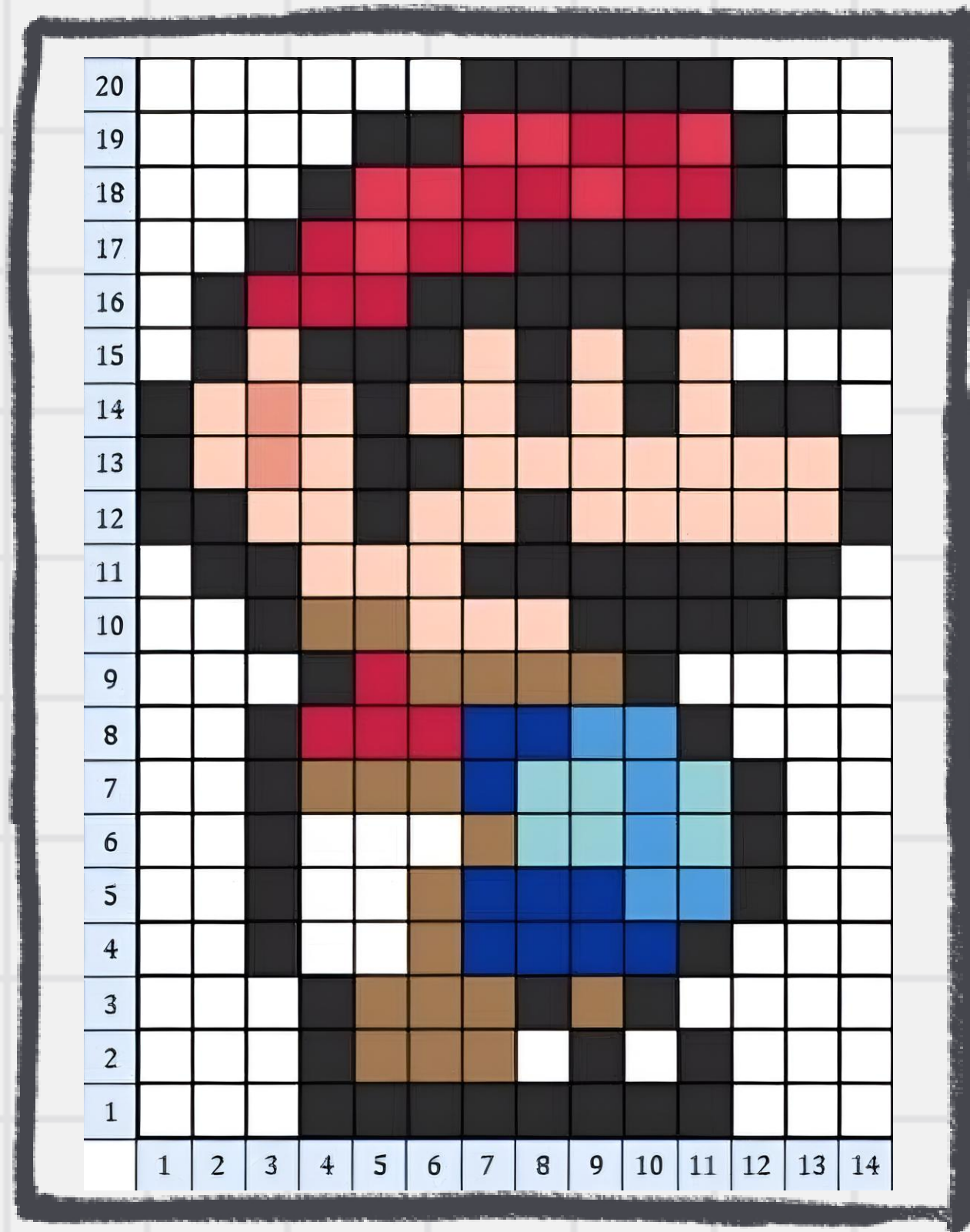


A geometric transformation in image processing and computer vision is a mathematical operation that modifies the spatial properties of an image by changing the position, orientation, or shape of its pixels while preserving or interpolating intensity values.

We will get to know some of them:

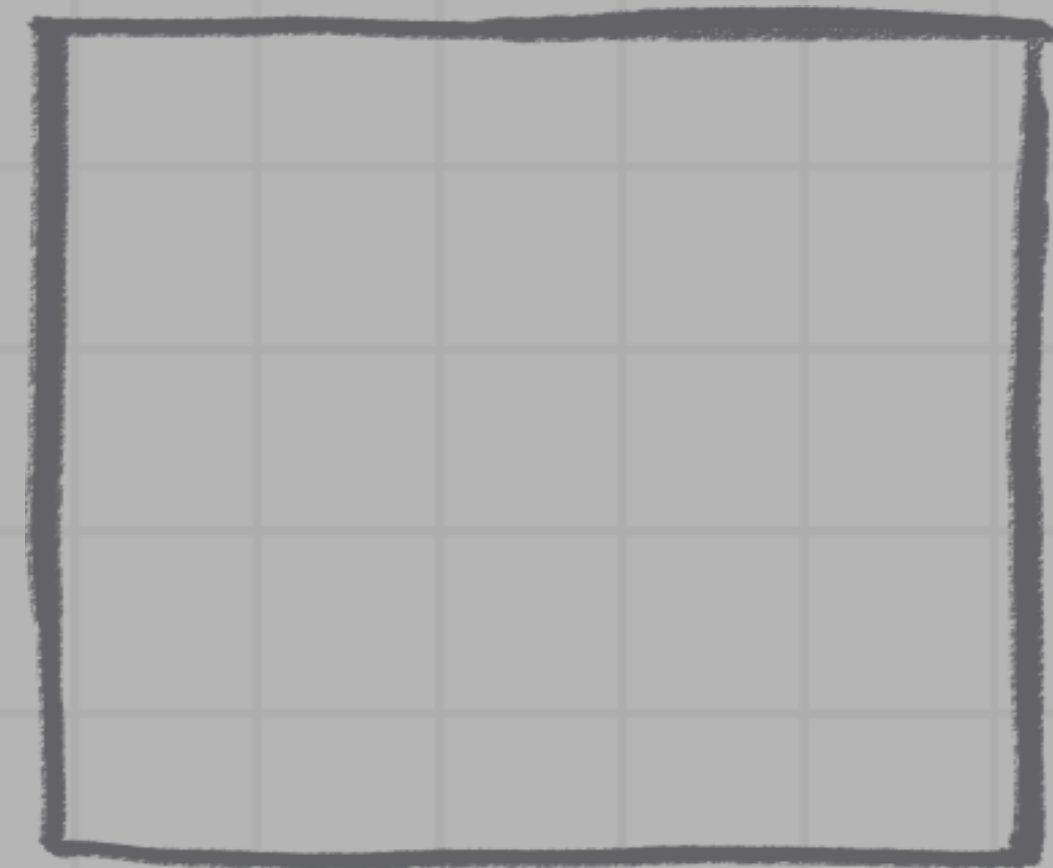
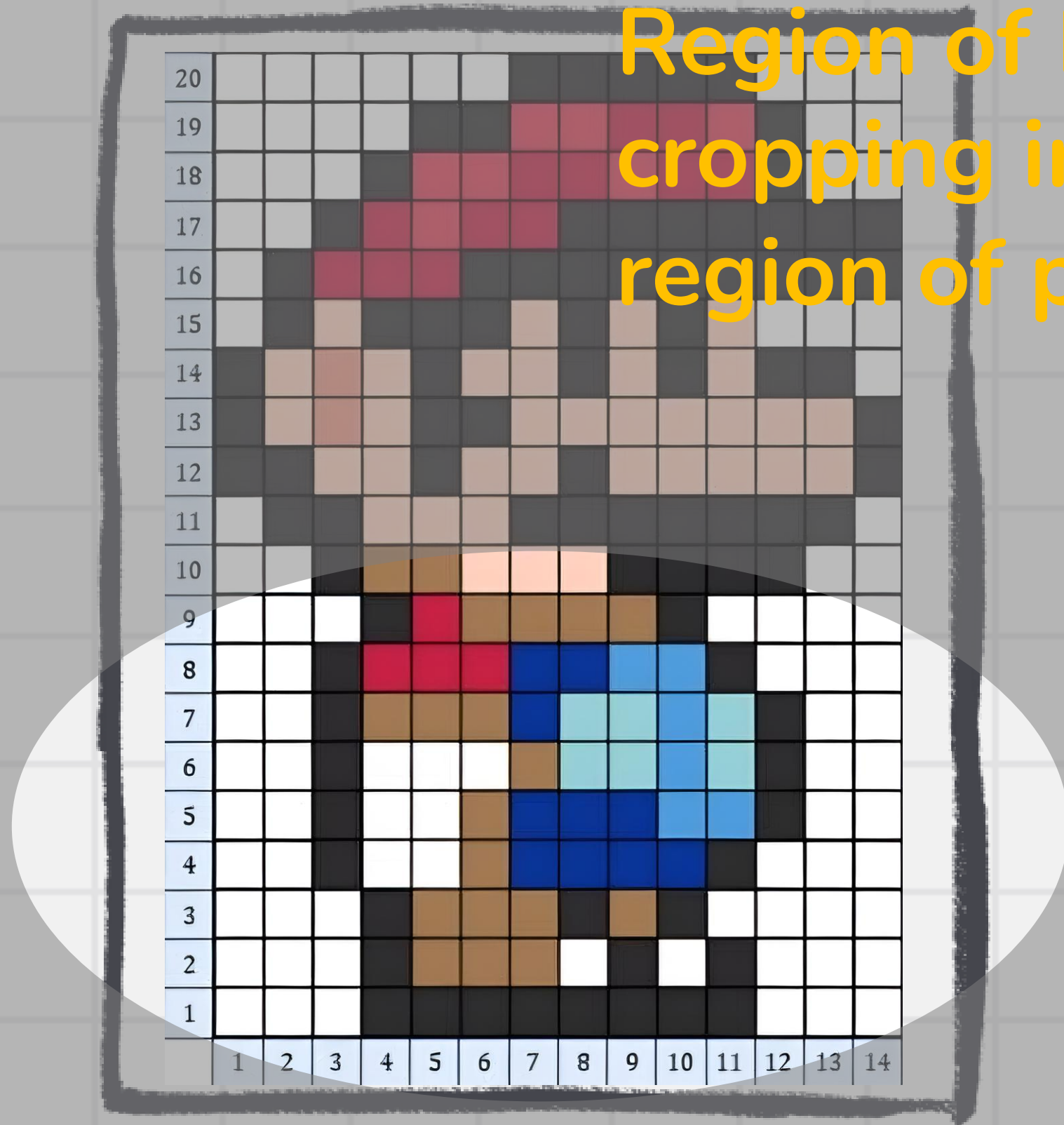
1. Region of Interest (ROI) Extraction
2. Image Rotation
3. Image Reflection

Region of Interest Extraction



Region of Interest Extraction

Region of Interest extraction is simply cropping image by keeping a specific region of pixels $[X_{initial}:X_{final}]$, $[Y_{initial}:Y_{final}]$



Region of Interest Extraction

Here we need to extract super Mario's body without his head, so we kept [0: 11], [0: 8]

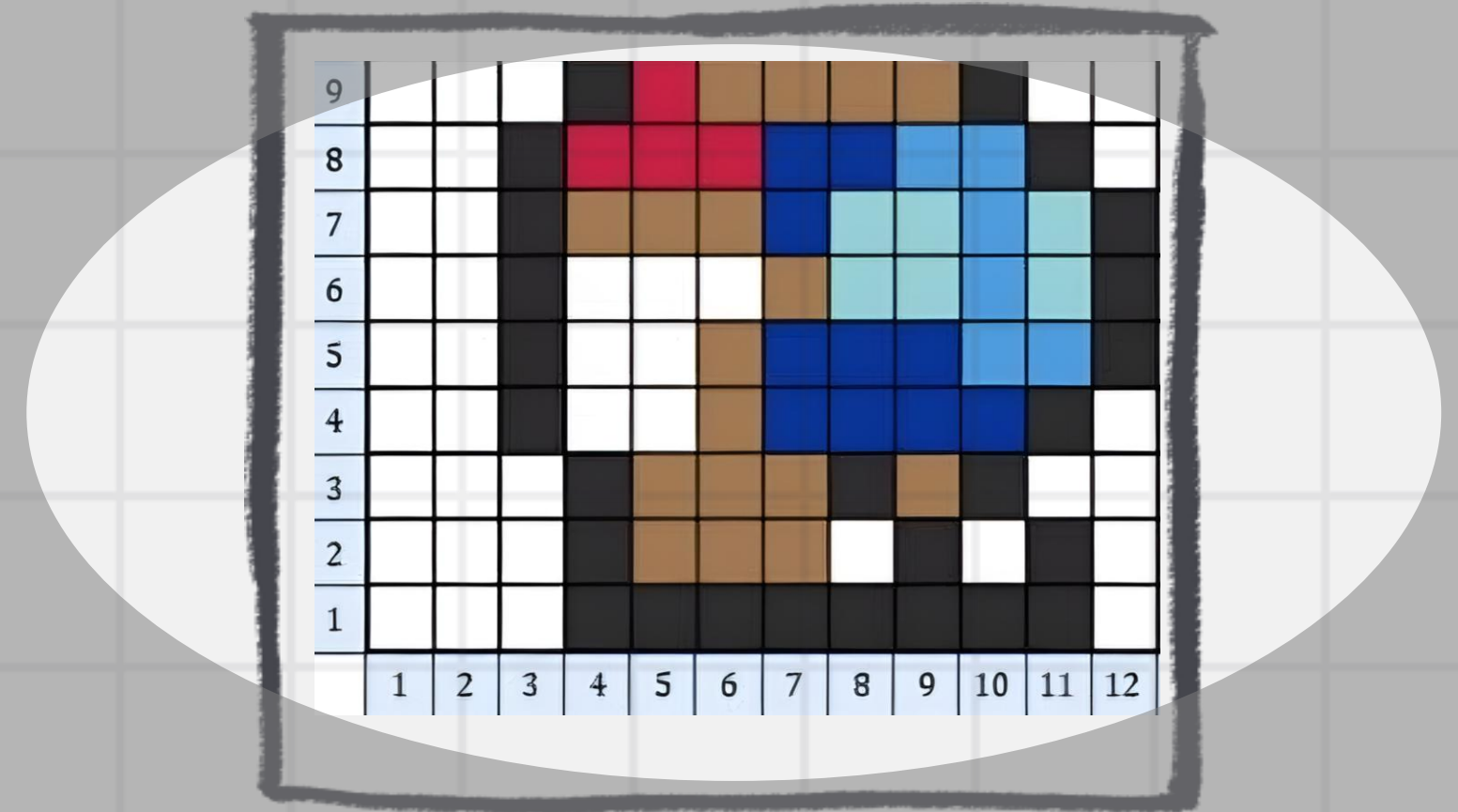
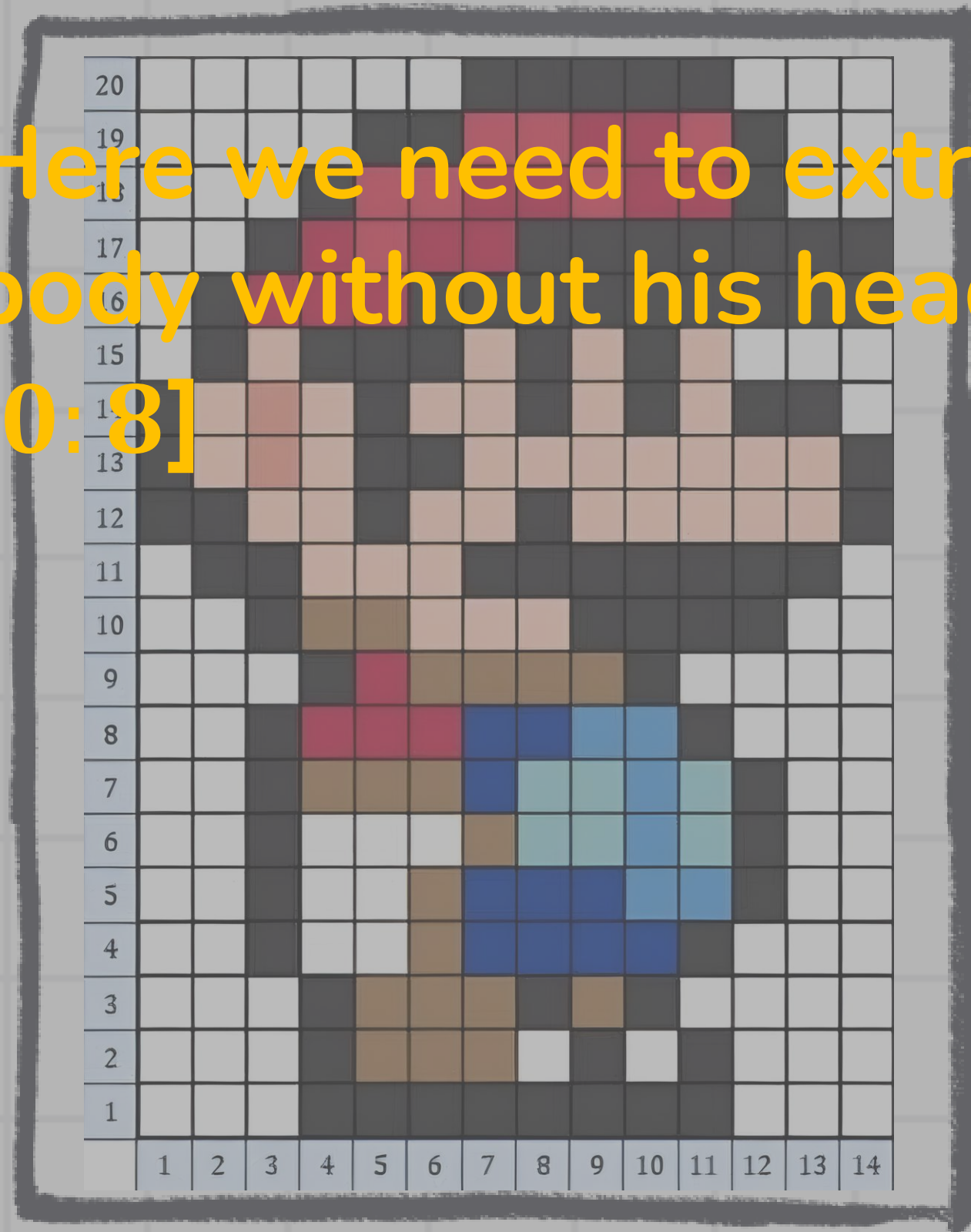


Image Rotation

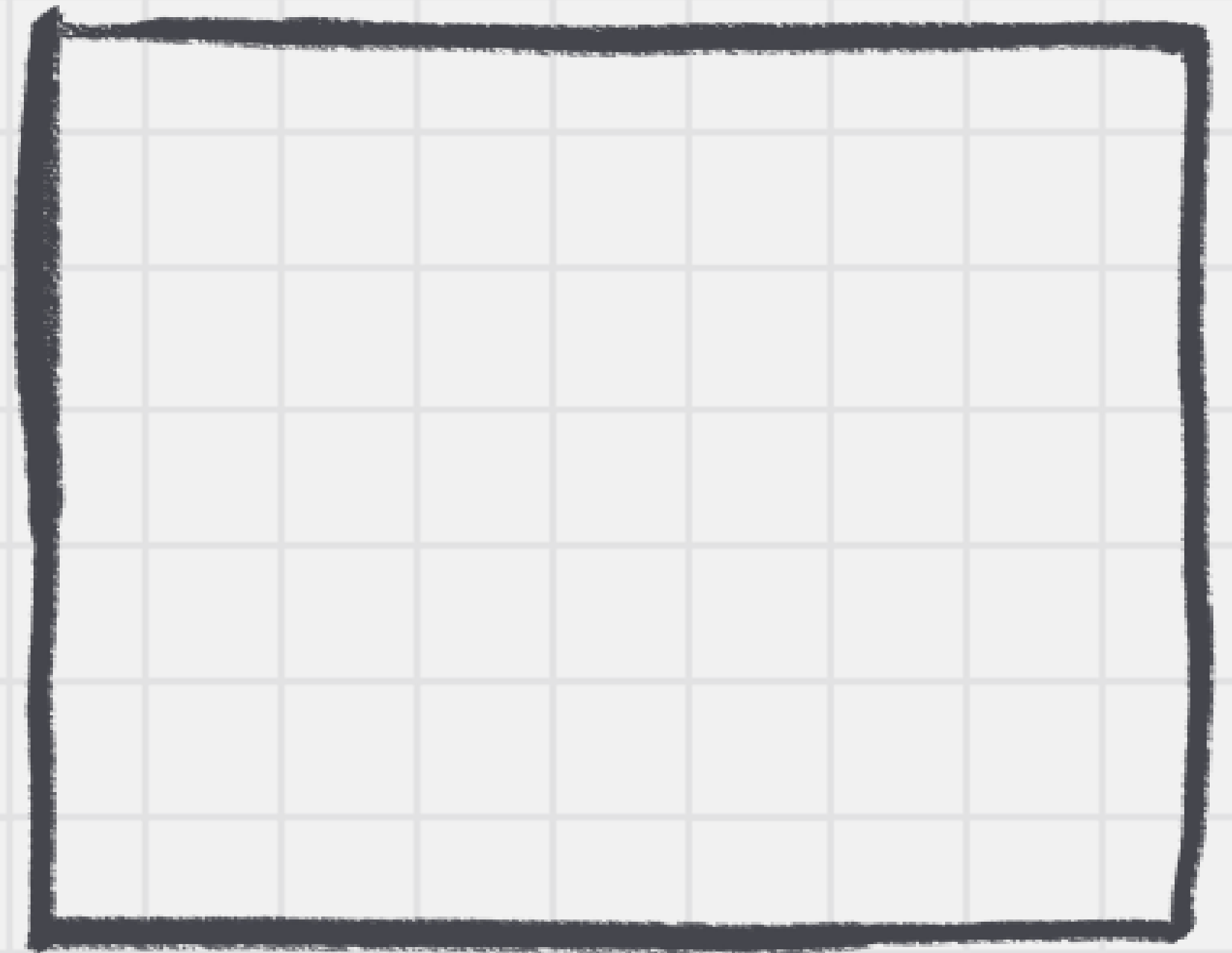
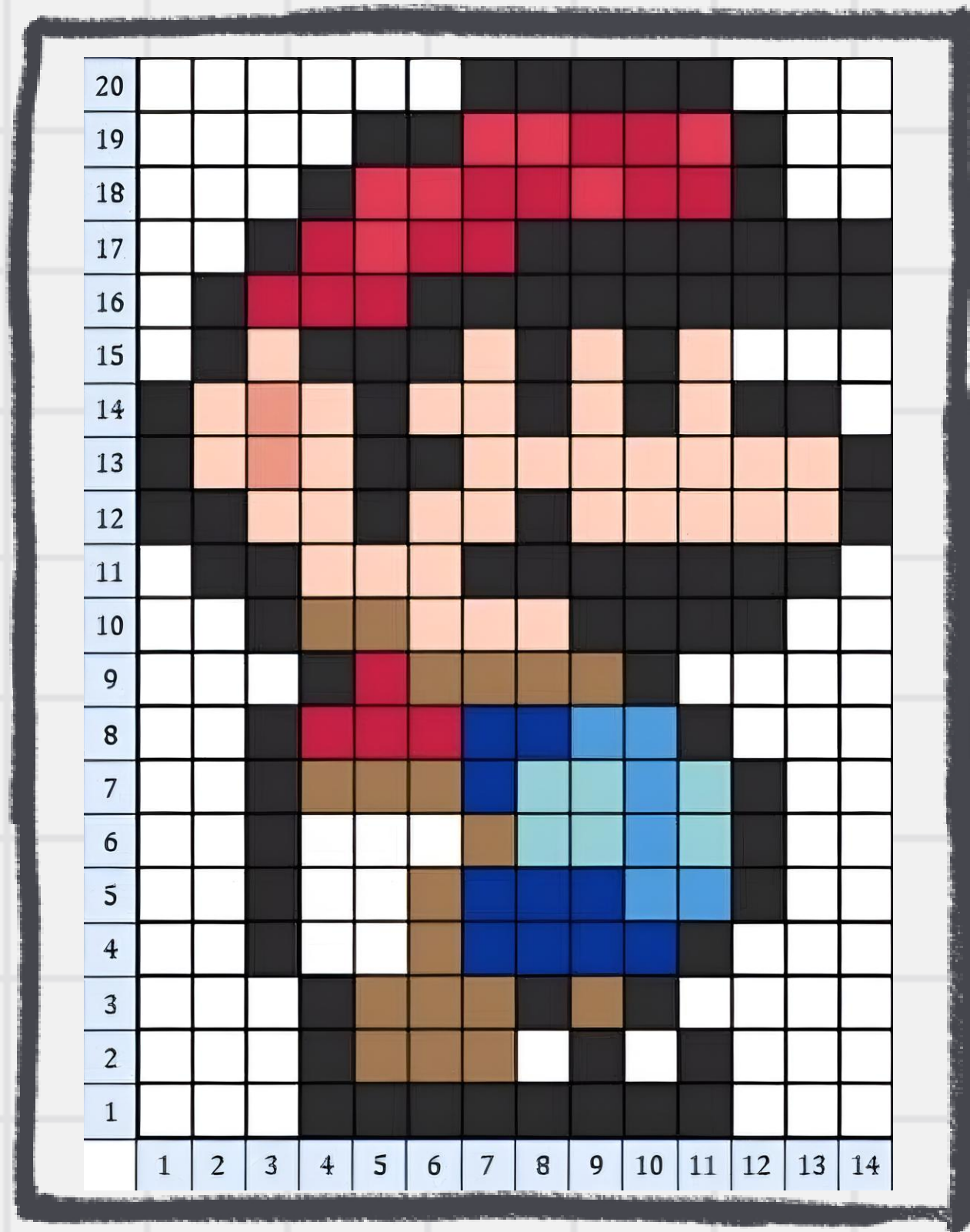


Image Rotation

Image Rotation is simply
transpose of matrix

$$\begin{bmatrix} a & b \\ d & e \\ g & h \end{bmatrix}$$

$$\begin{bmatrix} c \\ f \\ i \end{bmatrix} \Rightarrow \begin{bmatrix} a & d & g \\ b & e & h \\ c & f & i \end{bmatrix}$$

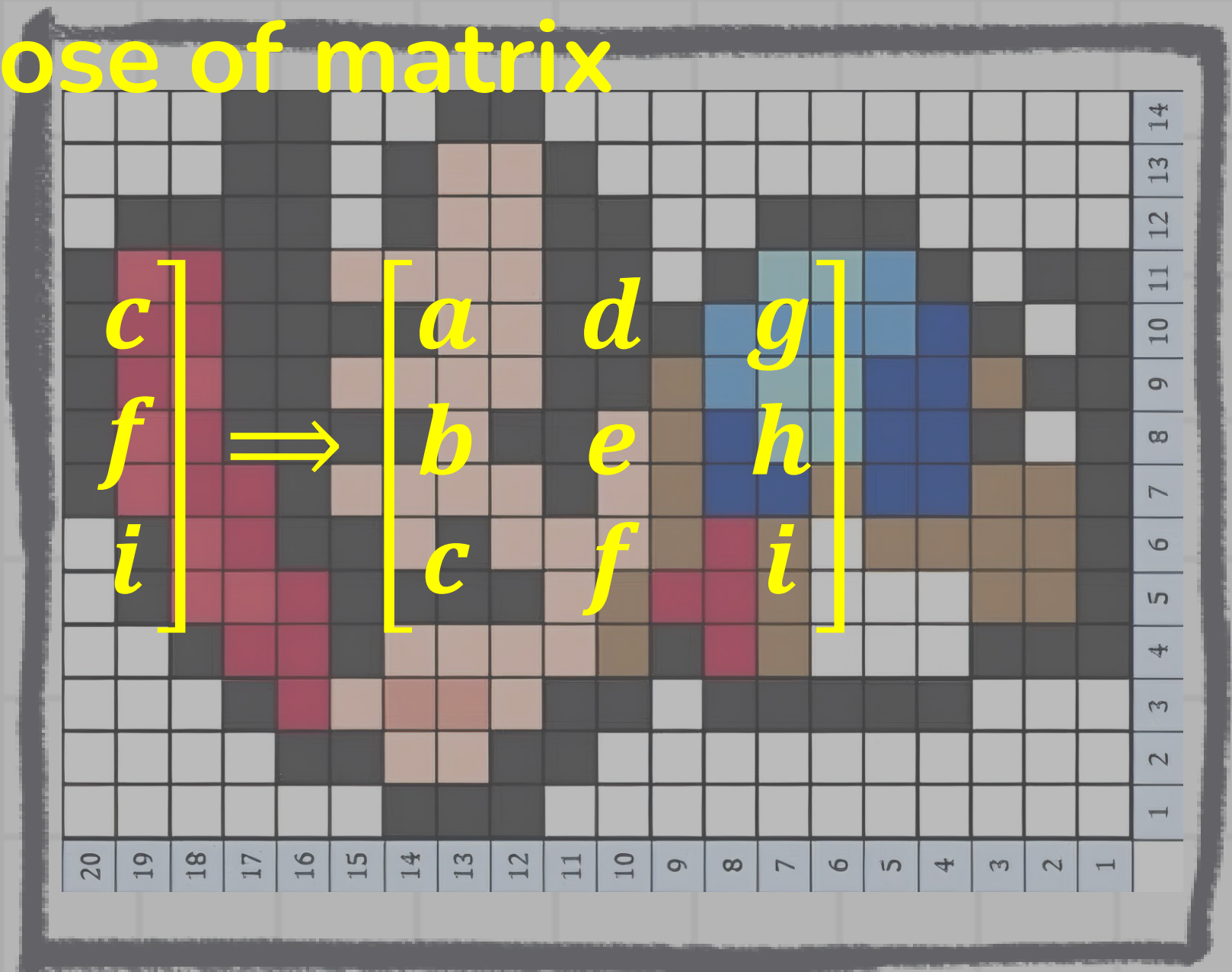


Image Rotation

That's simply what happens to rotate
image our y-axis moved to be x-axis and
x-axis moved to be y-axis

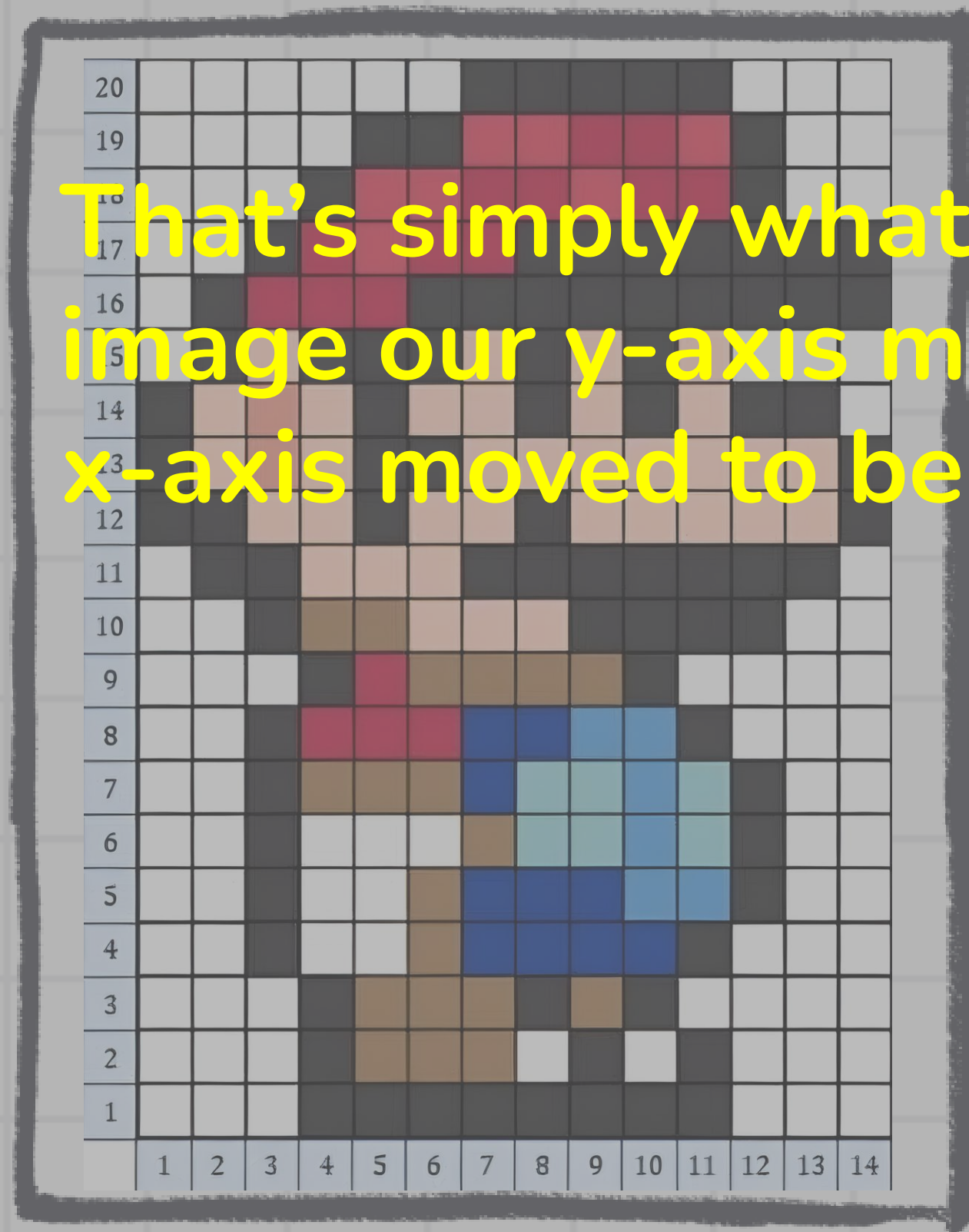


Image Reflection

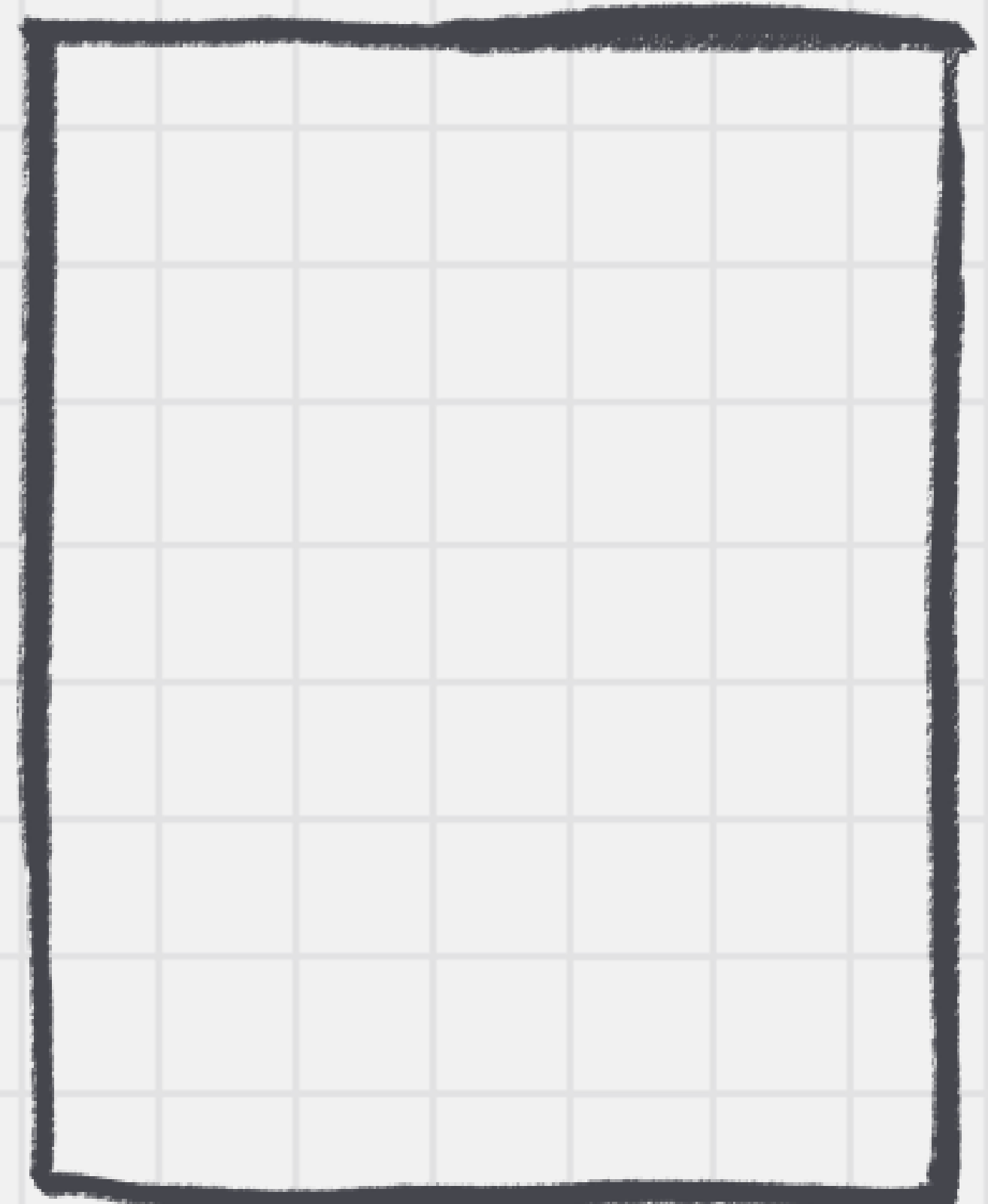
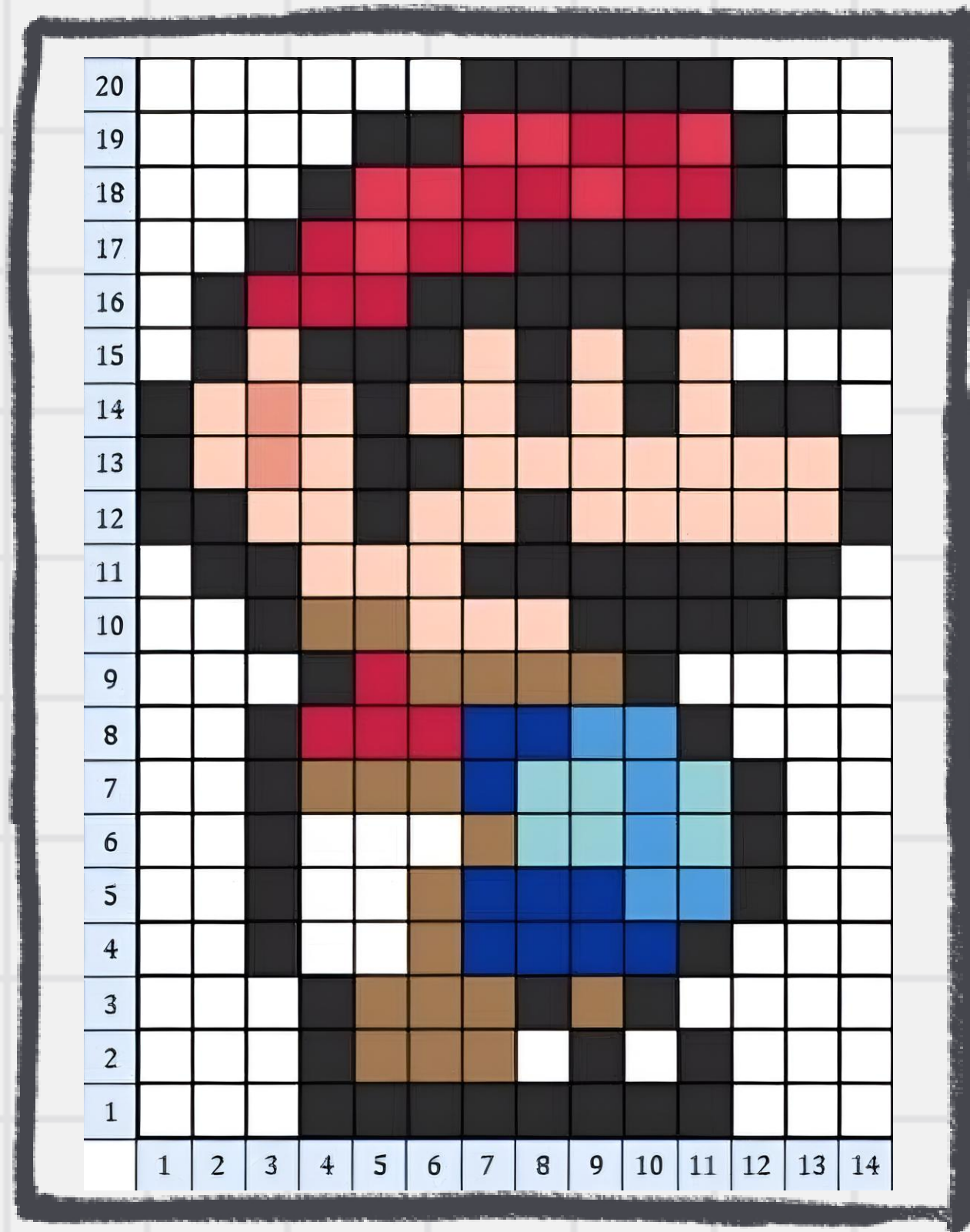
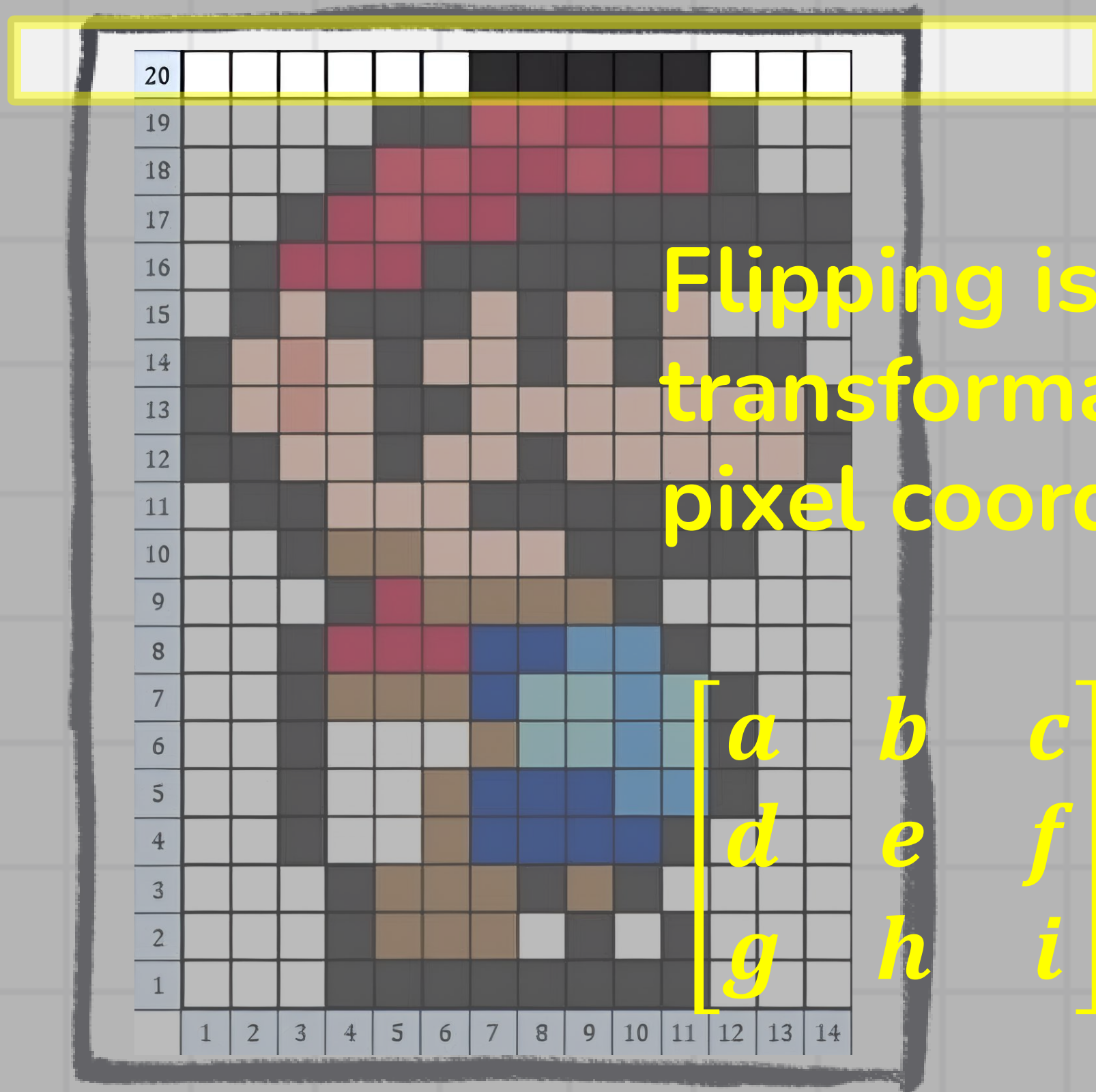


Image Reflection



Flipping is performed using a transformation matrix, which negates pixel coordinates along a specific axis.

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} \Rightarrow \begin{bmatrix} c & b & a \\ f & e & d \\ i & h & g \end{bmatrix}$$

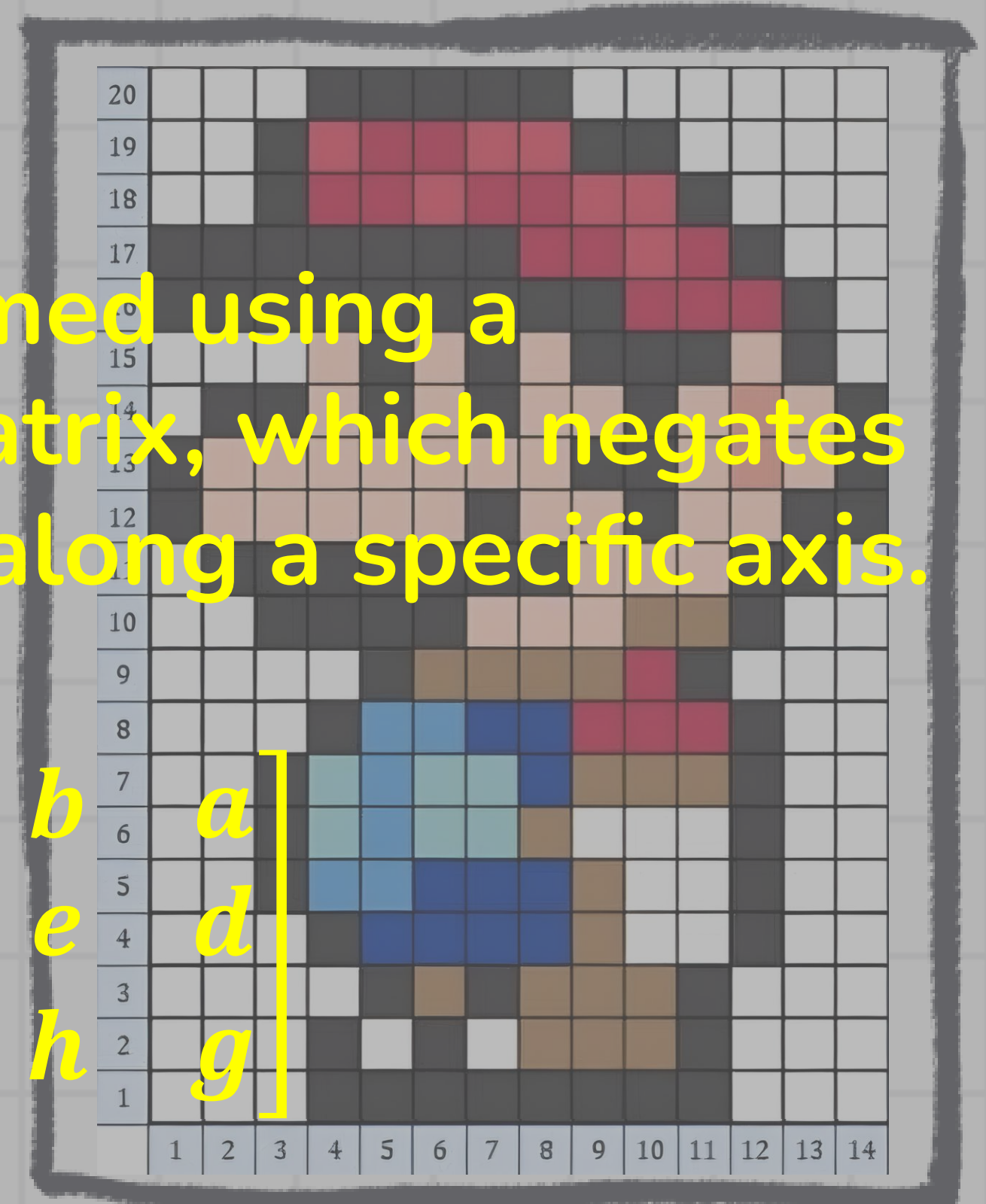
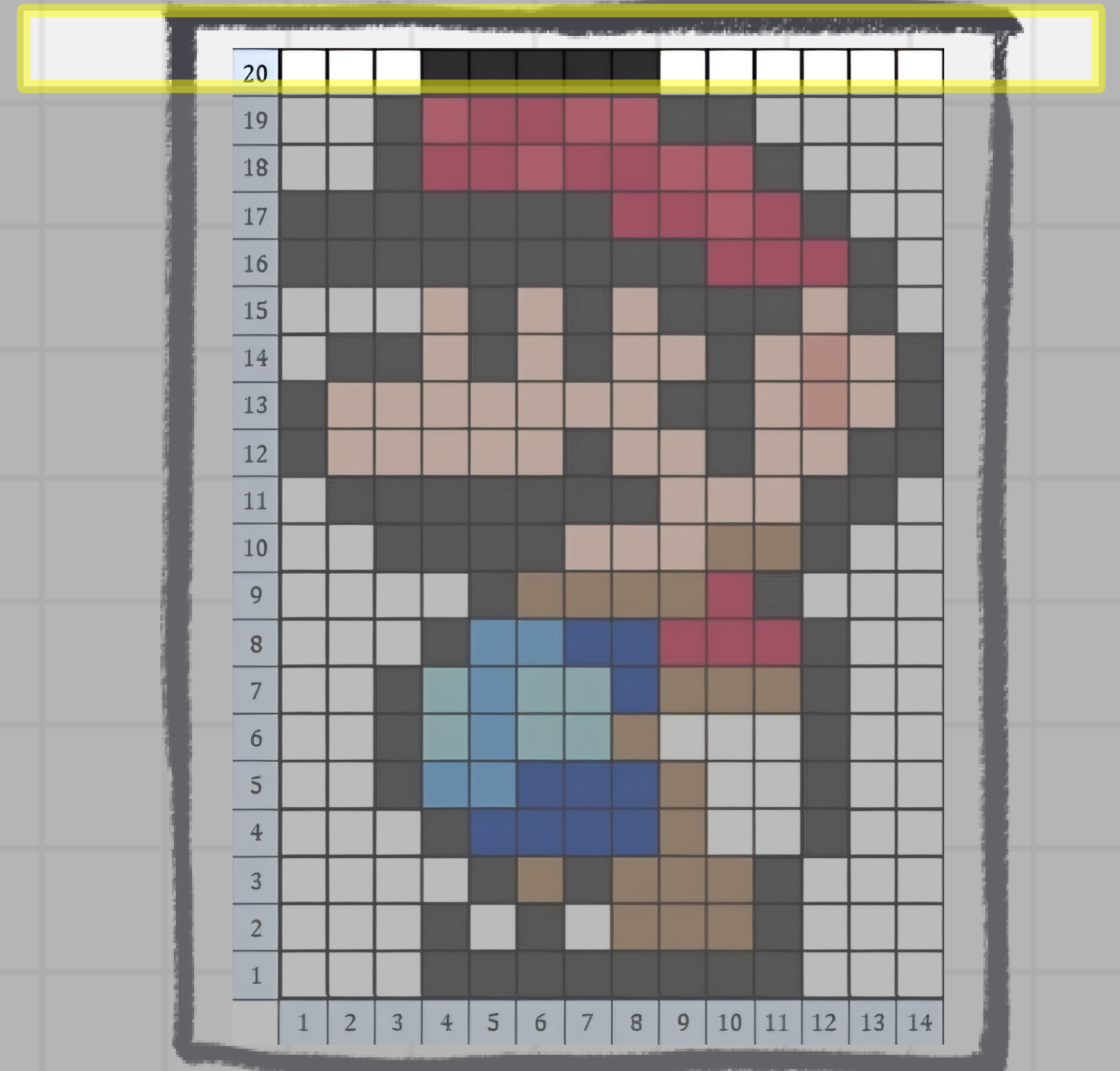
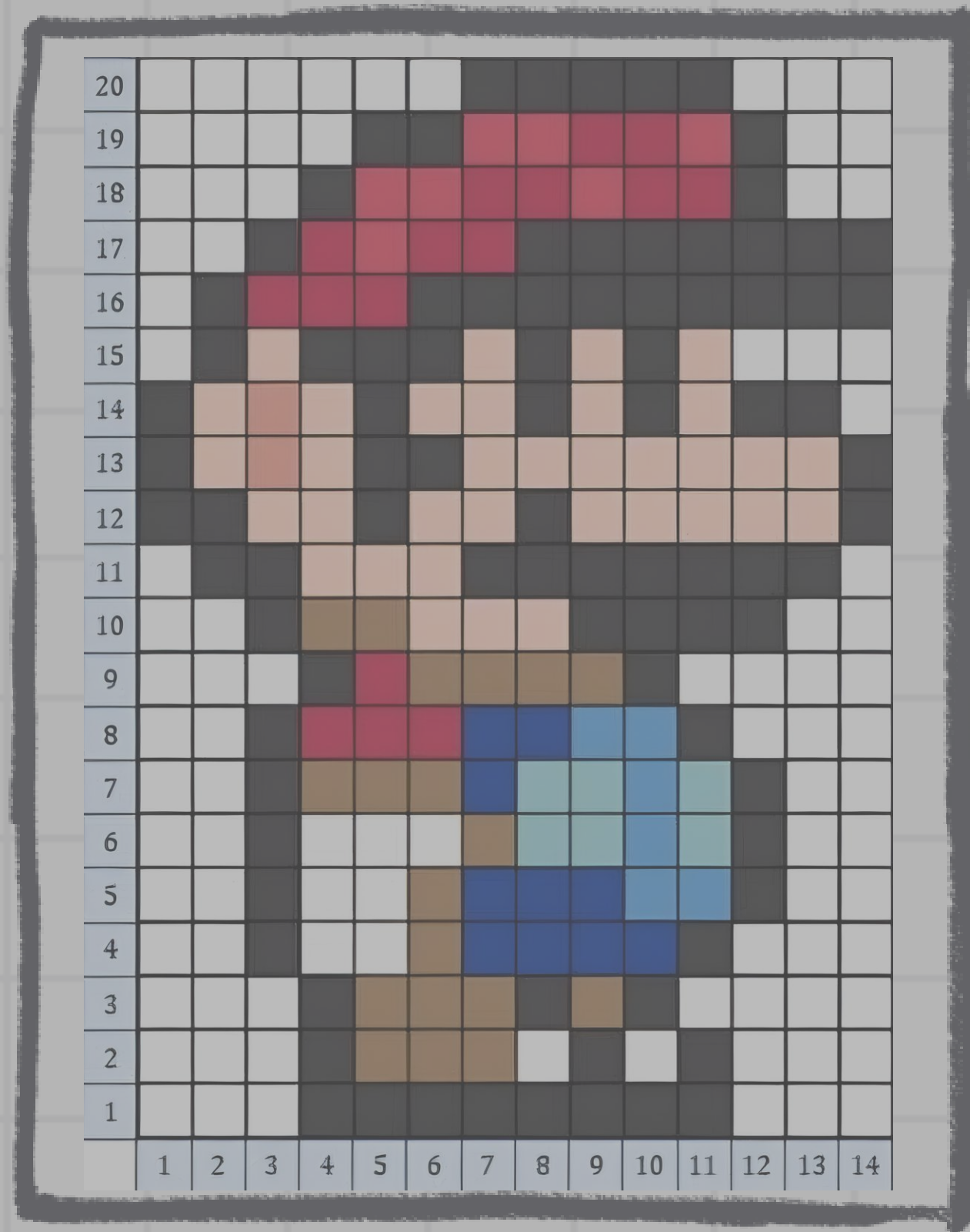
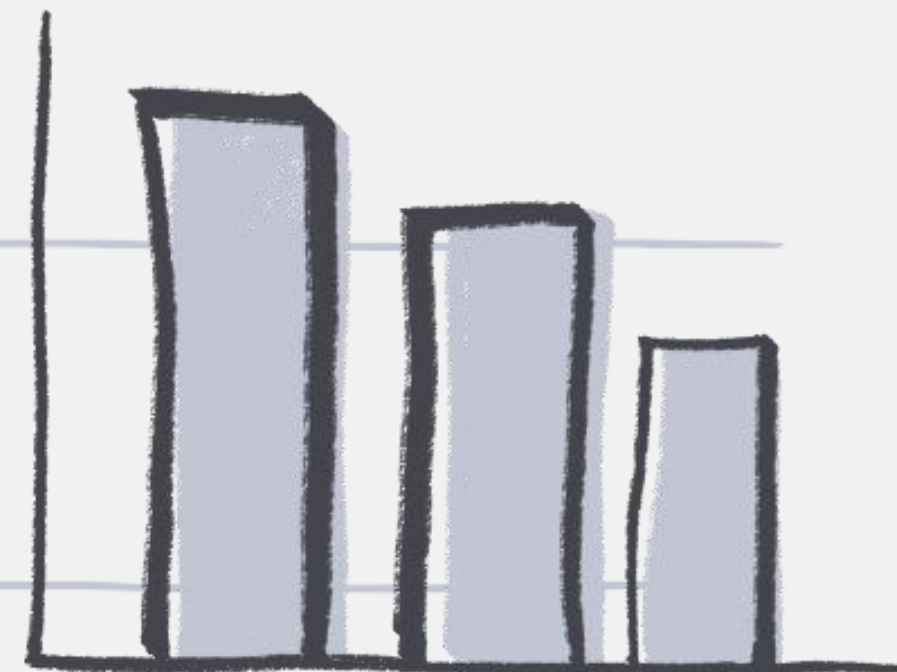


Image Reflection



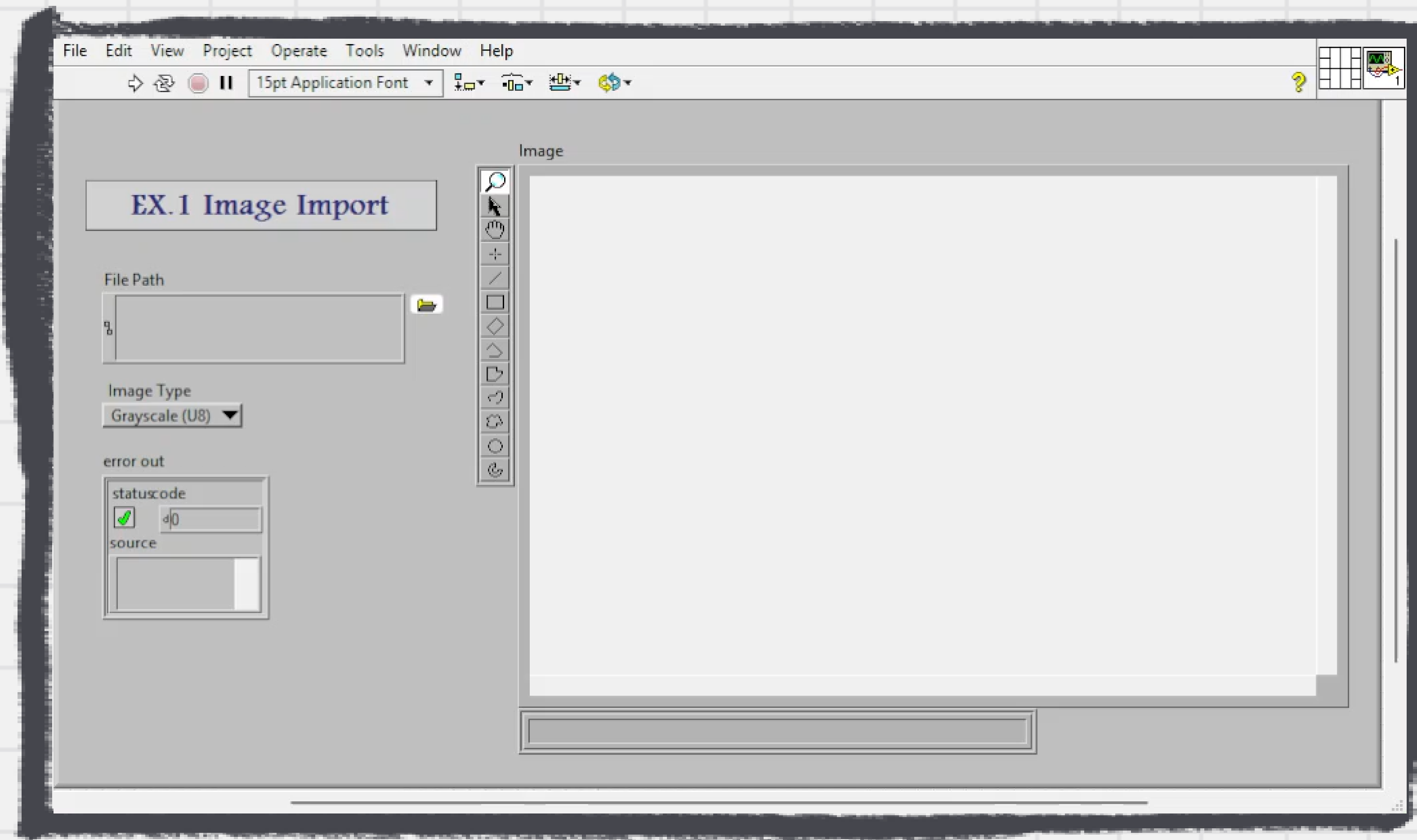


03

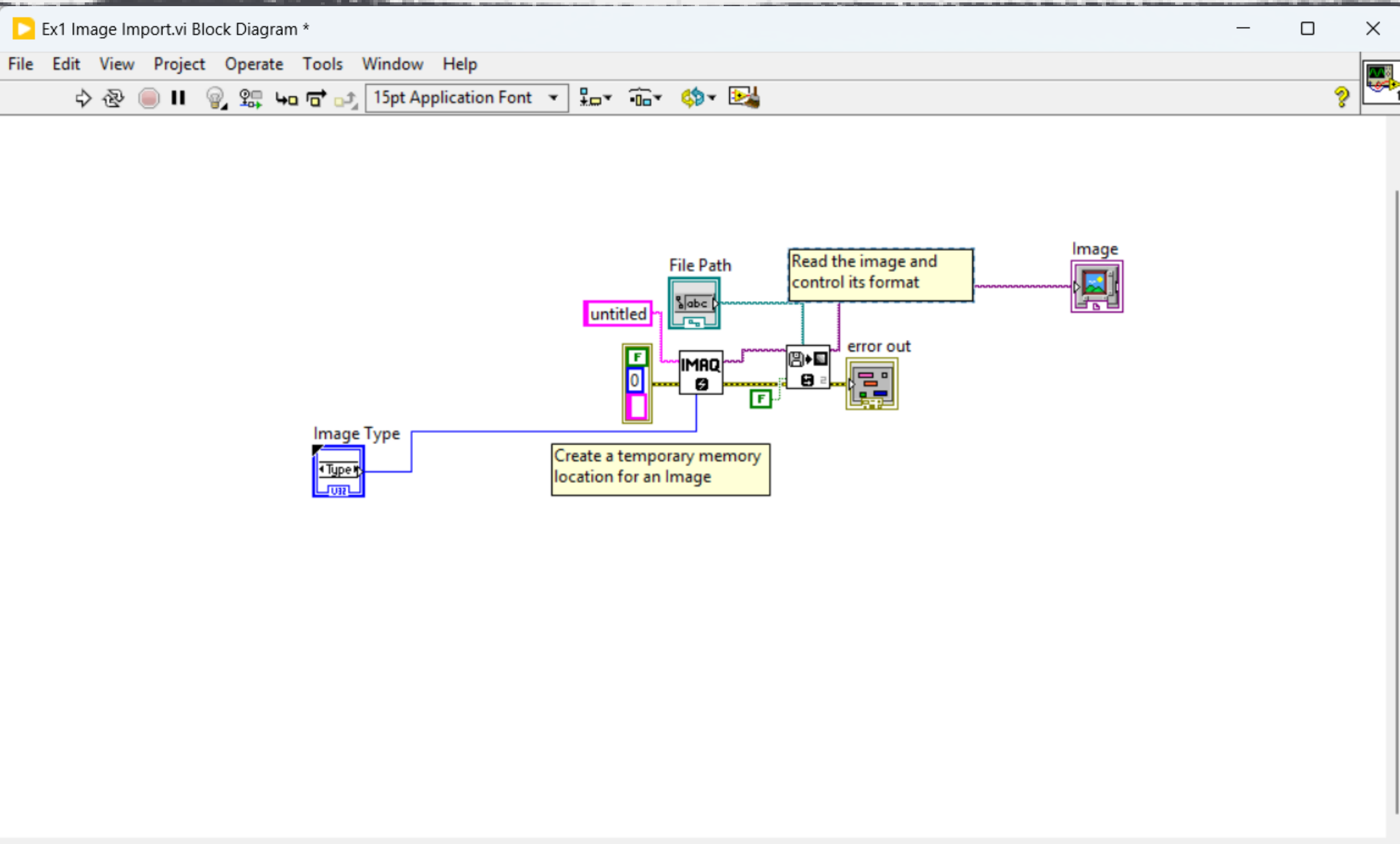


LabVIEW

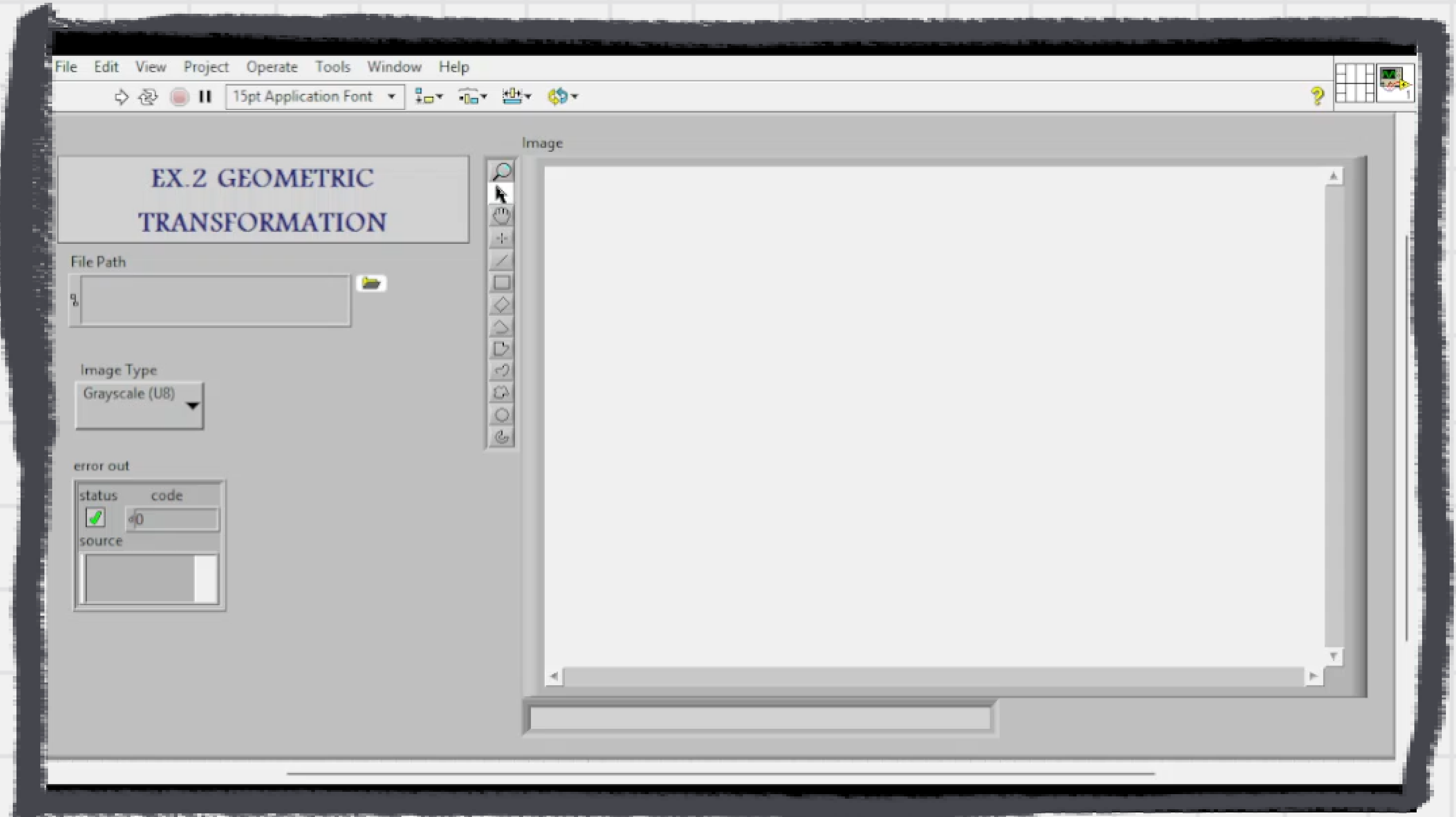
EX1. Image Import



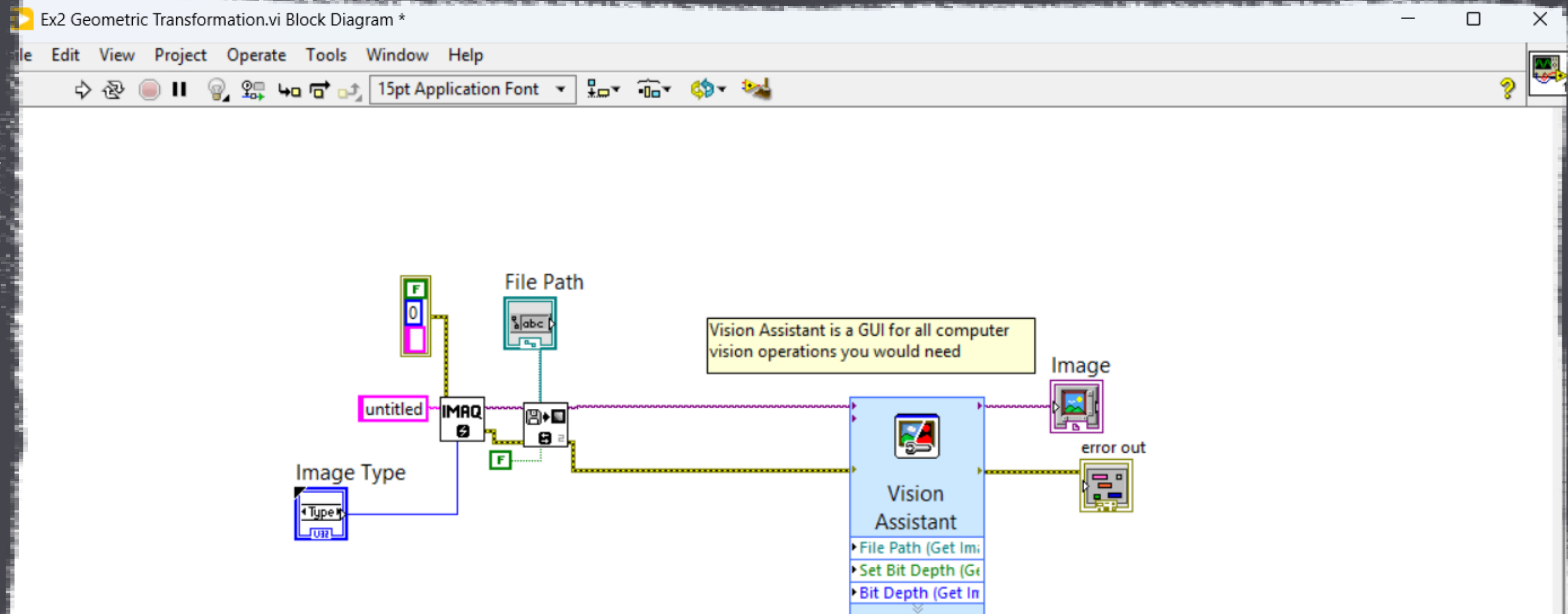
EX1. Image Import



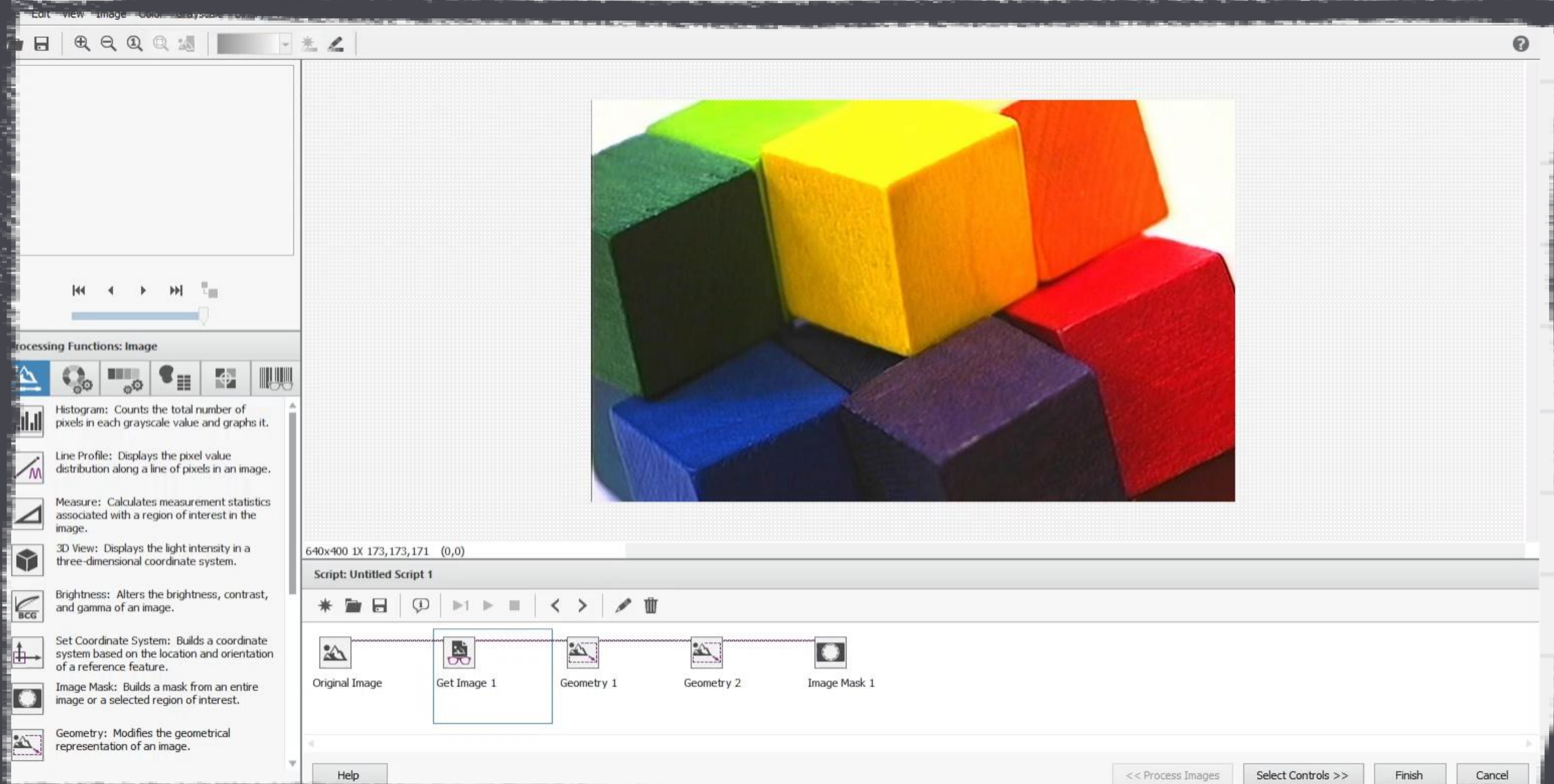
EX2. Geometric Transformation



EX2. Geometric Transformation



EX2. Geometric Transformation





A hand-drawn sign on a grid background. The sign is a rectangle with a thick black border and a smaller inner rectangle. The text 'THANK YOU' is written in a bold, black, hand-drawn font. 'THANK' is on the top line and 'YOU' is on the bottom line. A light blue oval highlights the word 'THANK', and a light blue horizontal bar highlights the word 'YOU'. The sign has a small tab on the right side.

THANK

YOU