CMPUT 175

Introduction to Foundations of Computing II
Winter 2015

Lab **10**

Task: Image Transformations
Data structure: Matrix (2-dimensional array)

Image Transformations

- You will complete code for the following functions
  - `flip_vertical(input_img, output_img)`
  - `flip_horizontal(input_img, output_img)`
  - `enlarge(input_img, output_img)`
- The functions should transform the given image by manipulating each pixel
- The `output_img` parameter will set the name of a new file to save the transformed image
- The `duplicate()` function has been completed for you, test it using the sample `.gif` image provided

`duplicate()` function

- Copies image pixel-by-pixel

```
def duplicate(input_img, output_img):
    img = image.Image(input_img)
    width = img.getWidth()
    height = img.getHeight()
    newimg = image.EmptyImage(width,height)

    for col in range(width):
        for row in range(height):
            px = img.getPixel(col,row)
            newimg.setPixel(col,row,px)

    newimg.saveTk(output_img)
```

`cImage` library

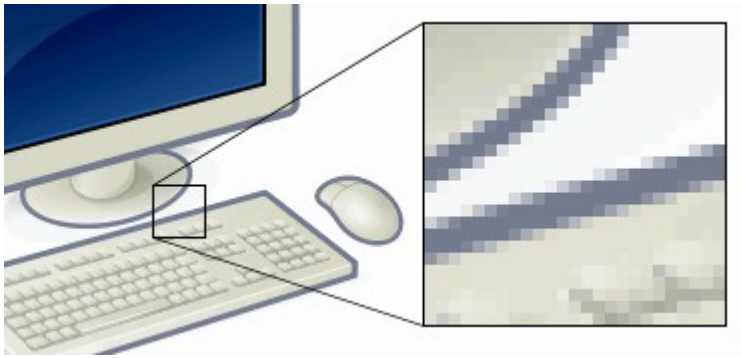
- Original source from www.github.com/bnmnetp/cImage
- Allows pixel-level manipulation of `.gif` files
- It only works with `.gif` images
  - There are other more complicated libraries for other image formats

`cImage` library

- Relevant classes
  - `Image`
  - `EmptyImage`
  - `Pixel`
- Relevant methods
  - `getWidth()`
  - `getHeight()`
  - `getPixel(col, row)`
  - `setPixel(col, row, px)`
  - `saveTk(file_name)`

Images and Pixels

- A pixel is the smallest component in a digital image
- Images are composed of many pixels
- Each pixel has its own color
- Think of an image as a matrix of pixels, i.e. two-dimensional array of pixels



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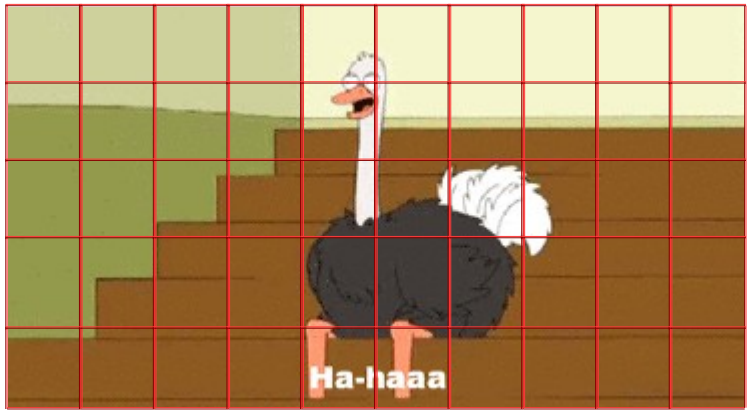
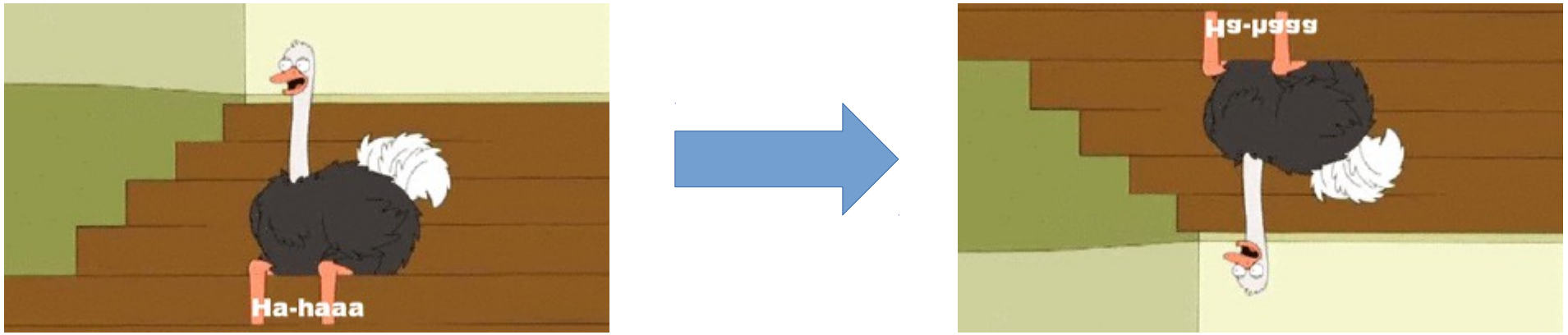


This is a simplified representation
Actual pixels are much smaller
parts of the image

Task 1: `flip_vertical`

- Vertically flip an image



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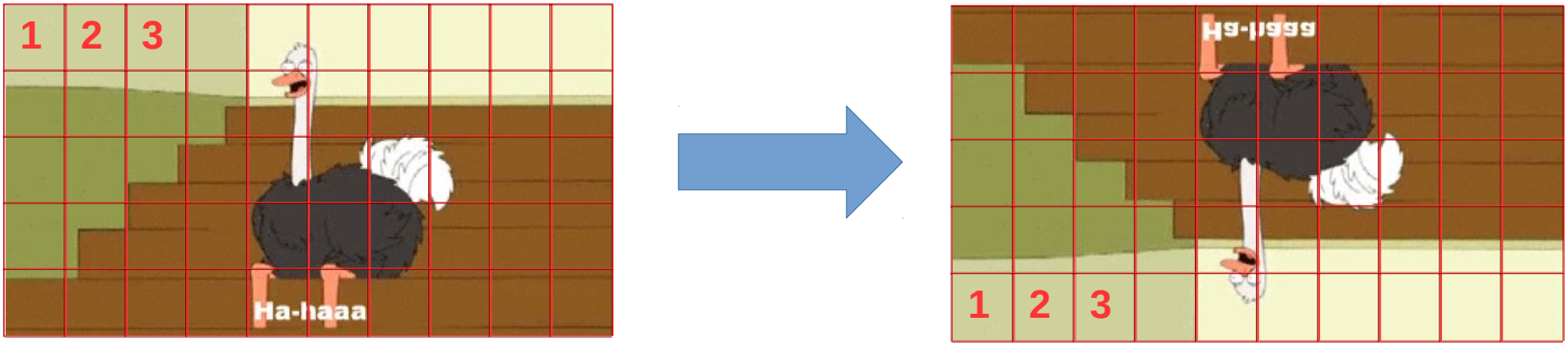
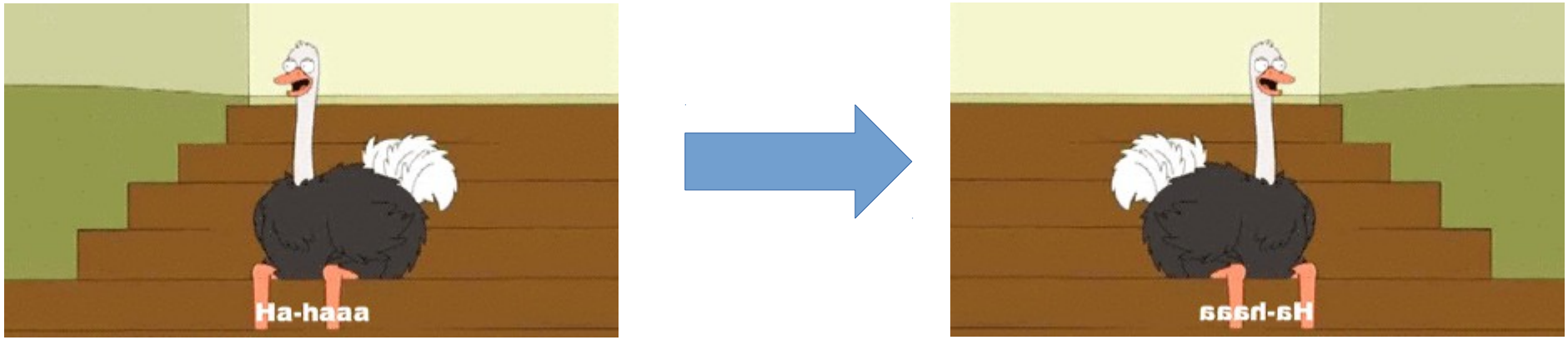
- Vertically flip an image



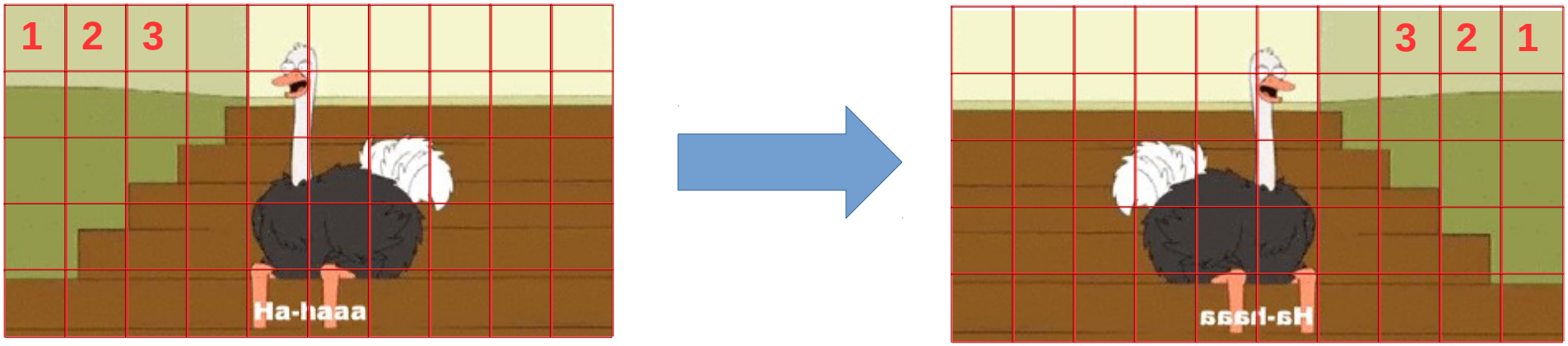
Task 2: `flip_horizontal`

- Horizontally flip an image



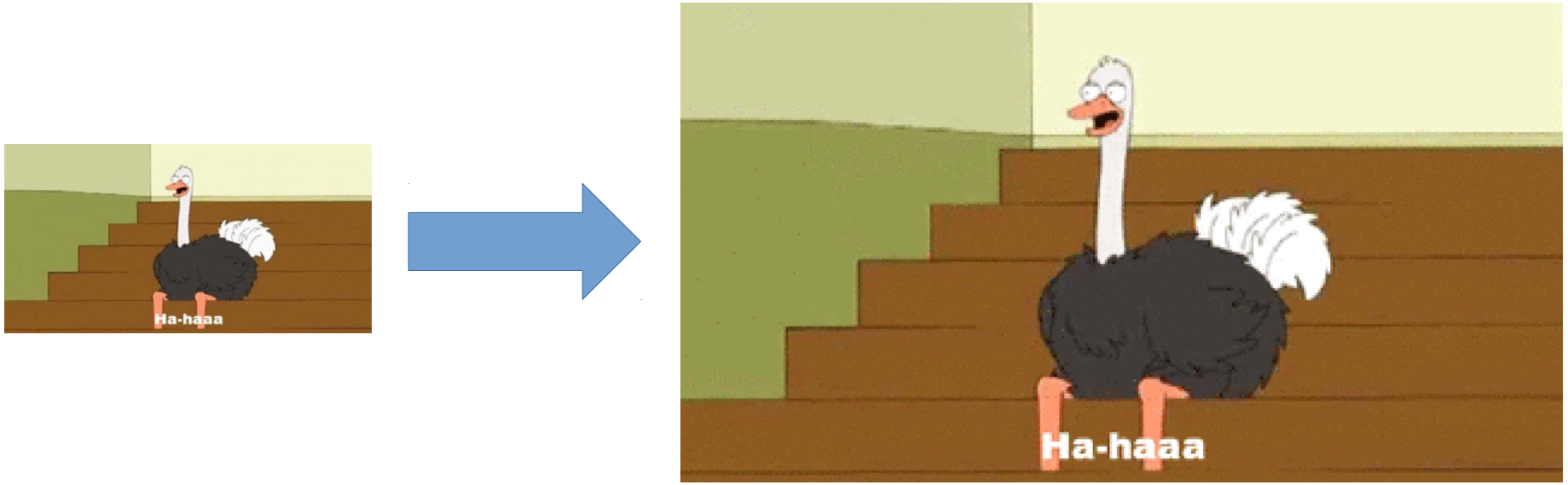
Task 2: `flip_horizontal`

- Horizontally flip an image



Task 3: `enlarge`

- Create a new image by enlarging the given input image



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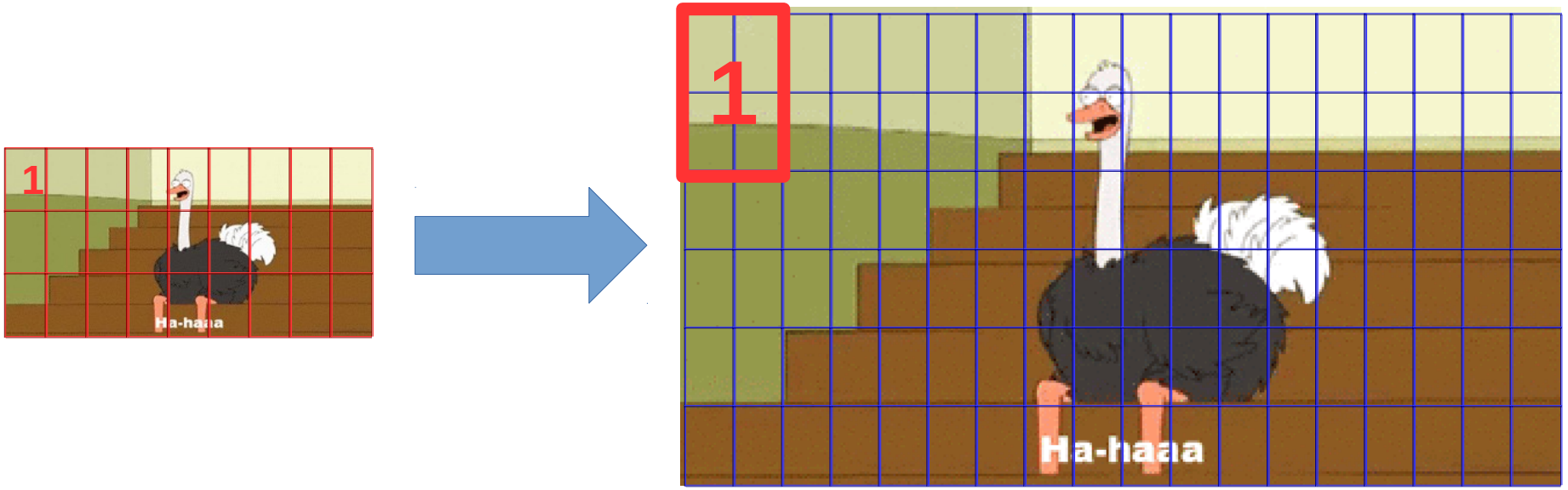

You just made some Photoshop functions!