#written by: Zachary Shenefield

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#places an image at a certain location on the canvas
def copyImage(canvas, image, xStart, yStart):
    for x in range(getWidth(image)):
        newX = x + xStart
        for y in range(getHeight(image)):
            newY = y + yStart
            pixel = getPixel(image, x, y)
            color = getColor(pixel)
            newPixel = getPixel(canvas, newX, newY)
            setColor(newPixel, color)
    return canvas

#makes the background have pixels of alternating colors
def grid(picture, color):
    height = getHeight(picture)
    width = getWidth(picture)
    for y in range(1, height, 2):
        for x in range(1, width, 2):
            p = getPixel(picture, x, y)
            setColor(p, color)
    return picture
# allows the scaling of an image

def scaleAny(source, n):
    canvas = makeEmptyPicture(int(getWidth(source) * n), int(getHeight(source) * n))
    sourceX = 0
    for targetX in range(0, getWidth(source) * n):
        sourceY = 0
        for targetY in range(0, getHeight(source) * n):
            color = getColor(getPixel(source, int(sourceX), int(sourceY)))
            setColor(getPixel(canvas, targetX, targetY), color)
            sourceY = sourceY + 1.0/n
            sourceX = sourceX + 1.0/n
    return canvas

# creates a colored border around an image

def colorBorder(borderColor, source):
    bottom = getHeight(source)-5
    end = getWidth(source)-5
    for pixels in getPixels(source):
        y = getY(pixels)
        if y < 5:
            setColor(pixels, borderColor)
        if y > bottom:
            setColor(pixels, borderColor)
        x = getX(pixels)
        if x < 5:
            setColor(pixels, borderColor)
        if x > end:
            setColor(pixels, borderColor)
    return source

# makes a picture cyanotype / blue hued

def makeBlue(picture):
    canvas = makeEmptyPicture(getWidth(picture), getHeight(picture))
    for p in getPixels(picture):
        intensity = (getRed(p) + getGreen(p) + getBlue(p)) / 3
        newPx = getPixel(canvas, getX(p), getY(p))
        setColor(newPx, makeColor(intensity, intensity, intensity))

    for newPx in getPixels(canvas):
        red = getRed(newPx)
        blue = getBlue(newPx)
        green = getGreen(newPx)
if (blue < 63):
    blue = blue*2.0

if (red > 62 and red < 192):
    blue = blue*1.3

if (blue > 191):
    blue = blue*1.2

    setBlue(p, blue)
    red = red*0.75
    green = green*0.75
    setRed(newPx, red)
    setGreen(newPx, green)
return canvas

#makes a picture red hued

def makeRed(picture):
    canvas = makeEmptyPicture(getWidth(picture), getHeight(picture))
    for p in getPixels(picture):
        intensity = (getRed(p)+getGreen(p)+getBlue(p))/3
        newPx = getPixel(canvas, getX(p), getY(p))
        setColor(newPx, makeColor(intensity, intensity, intensity))

    for newPx in getPixels(canvas):
        red = getRed(newPx)
        blue = getBlue(newPx)
        green = getGreen(newPx)

        if (red < 63):
            red = red*2.0

        if (blue > 62 and blue < 192):
            red = red*1.3

        if (red > 191):
            red = red*1.2

        setRed(p, red)
        blue = blue*0.75
        green = green*0.75
        setBlue(newPx, blue)
        setGreen(newPx, green)
def makeGreen(picture):
    canvas = makeEmptyPicture(getWidth(picture), getHeight(picture))
    for p in getPixels(picture):
        intensity = (getRed(p)+getGreen(p)+getBlue(p))/3
        newPx = getPixel(canvas, getX(p), getY(p))
        setColor(newPx, makeColor(intensity, intensity, intensity))

    for newPx in getPixels(canvas):
        red = getRed(newPx)
        blue = getBlue(newPx)
        green = getGreen(newPx)

        if (green < 63):
            green = green*2.0

        if (red > 62 and red < 192):
            green = green*1.3

        if (green > 191):
            green = green*1.2

        setGreen(p, green)
        red = red*0.75
        blue = blue*0.75
        setRed(newPx, red)
        setBlue(newPx, blue)
    return canvas

def negative(picture):
    canvas = makeEmptyPicture(getWidth(picture), getHeight(picture))
    for px in getPixels(picture):
        red = getRed(px)
        green = getGreen(px)
        blue = getBlue(px)
        negColor = makeColor(255-red, 255-green, 255-blue)
        newPx = getPixel(canvas, getX(px), getY(px))
        setColor(newPx, negColor)
    return canvas
# mirrors a picture horizontally

def mirrorHorizontal(picture, mirrorPoint):
    canvas = makeEmptyPicture(getWidth(picture), getHeight(picture))
    width = getWidth(picture)

    for x in range(0, getWidth(picture)):
        for y in range(0, getHeight(picture)):
            px = getPixel(picture, x, y)
            newPx = getPixel(canvas, x, y)
            color = getColor(px)
            setColor(newPx, color)

    for y in range(0, getHeight(picture)):
        for x in range(0, mirrorPoint):
            leftPixel = getPixel(picture, x, y)
            rightPixel = getPixel(canvas, width-x-1, y)
            color = getColor(leftPixel)
            setColor(rightPixel, color)

    return canvas

# mirrors a picture vertically

def mirrorVertical(picture, mirrorPoint):
    canvas = makeEmptyPicture(getWidth(picture), getHeight(picture))
    height = getHeight(picture)

    for x in range(0, getWidth(picture)):
        for y in range(0, getHeight(picture)):
            px = getPixel(picture, x, y)
            newPx = getPixel(canvas, x, y)
            color = getColor(px)
            setColor(newPx, color)

    for x in range(0, getWidth(picture)):
        for y in range(0, mirrorPoint):
            topPixel = getPixel(picture, x, y)
            bottomPixel = getPixel(canvas, x, height-y-1)
            color = getColor(topPixel)
            setColor(bottomPixel, color)

    return canvas
# takes non-white sections from an image and pastes them on a background at specific coordinates, as a specified color

def chromakey(source, bg, startX, startY, color):
    for px in getPixels(source):
        x = getX(px)
        y = getY(px)
        if (getRed(px) < 150 and getGreen(px) < 150 and getBlue(px) < 150):
            newPx = getPixel(bg, x + startX, y + startY)
            setColor(newPx, color)

# final program that creates a collage

def collage():

    canvas = makeEmptyPicture(1000, 736, black)
    swan = makePicture(getMediaPath("swan.jpg"))
    signature = makePicture(getMediaPath("signature.jpg"))

    canvas = grid(canvas, magenta)

    picture = copyImage(canvas, swan, (getWidth(canvas)/2) - (getWidth(swan)/2),
                        (getHeight(canvas)/2) - (getHeight(swan)/2))

    smallSwan = scaleAny(swan, 0.45)
    smallSwan2 = scaleAny(swan, 0.575)

    redSwan = makeRed(smallSwan2)
    blueSwan = makeBlue(smallSwan)
    greenSwan = makeGreen(smallSwan2)
    negativeSwan = negative(smallSwan)

    redSwan = colorBorder(redSwan, redSwan)
    blueSwan = colorBorder(blueSwan, blueSwan)
    greenSwan = colorBorder(greenSwan, greenSwan)
    negativeSwan = colorBorder(gray, negativeSwan)

    redSwanMirror = mirrorVertical(redSwan, getHeight(redSwan))
    redSwanMirror = mirrorHorizontal(redSwanMirror, getWidth(redSwanMirror))

    greenSwanMirror = mirrorHorizontal(greenSwan, getWidth(greenSwan))
    greenSwanMirror2 = mirrorVertical(greenSwan, getHeight(greenSwan))

    blueSwanMirror = mirrorHorizontal(blueSwan, getWidth(blueSwan)/2)
    blueSwanMirror2 = mirrorVertical(blueSwanMirror, getHeight(blueSwan))
negativeSwanMirror = mirrorVertical(negativeSwan, getHeight(negativeSwan)/2)
negativeSwanMirror2 = mirrorHorizontal(negativeSwanMirror, getWidth(negativeSwan))

picture = copyImage(picture, redSwan, 0, 0)
picture = copyImage(picture, blueSwanMirror, (getWidth(canvas)/2) - (getWidth(blueSwanMirror)/2), 0)
picture = copyImage(picture, greenSwanMirror, (getWidth(canvas)) - (getWidth(greenSwanMirror)), 0)

picture = copyImage(picture, negativeSwanMirror, 0, getHeight(canvas)/2 - (getHeight(negativeSwanMirror)/2))
picture = copyImage(picture, negativeSwanMirror2, (getWidth(canvas)) - getWidth(negativeSwanMirror2), getHeight(canvas)/2 - (getHeight(negativeSwanMirror2)/2))

picture = copyImage(picture, greenSwanMirror2, 0, getHeight(canvas)-getHeight(greenSwanMirror2))
picture = copyImage(picture, blueSwanMirror2, (getWidth(canvas)/2) - (getWidth(blueSwanMirror2)/2), getHeight(canvas)-getHeight(blueSwanMirror2))
picture = copyImage(picture, redSwanMirror, (getWidth(canvas)) - (getWidth(redSwanMirror)), getHeight(canvas)-getHeight(redSwanMirror))

signature = scaleAny(signature,0.12)
chromakey(signature,picture,900,640,white)

show(picture)

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