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#Date: 10/23/2022

def scale(source, canvas, factor):
    sourceX = 0
    for targetX in range(0, getWidth(canvas)):
        sourceY = 0
        for targetY in range(0, getHeight(canvas)):
            color = getColor(getPixel(source, int(sourceX), int(sourceY)))
            setColor(getPixel(canvas, targetX, targetY), color)
            sourceY = sourceY + factor
            sourceX = sourceX + factor
    return canvas

def copy(source, canvas, targX, targY):
    targetX = targX
    for sourceX in range(0, getWidth(source)):
        targetY = targY
        for sourceY in range(0, getHeight(source)):
            color = getColor(getPixel(source, sourceX, sourceY))
            setColor(getPixel(canvas, targetX, targetY), color)
            targetY = targetY + 1
            targetX = targetX + 1
    return(canvas)

def grayScale(picture):
    for p in getPixels(picture):
        intensity = (getRed(p) + getGreen(p) + getBlue(p)) / 3
        setColor(p, makeColor(intensity, intensity, intensity))

def cyanotype(picture):
    grayScale(picture)
    for p in getPixels(picture):
        blue = getBlue(p)
        red = getRed(p)
        green = getGreen(p)
        if (blue<63):
            setBlue(p, blue*2)
        elif(63 <= blue <= 191):
            setBlue(p, blue*1.3)
        else:
            setBlue(p, blue*1.2)
        setRed(p, red*0.75)
        setGreen(p, green*0.75)
def light(pic):
    for x in range(0, getWidth(pic)):
        for y in range(0, getHeight(pic)):
            px = getPixel(pic, x, y)
            color = getColor(px)
            newColor = makeLighter(color)
            newerColor = makeLighter(newColor)
            setColor(px, newerColor)

# original function
def originalFunction(pic):
    cyanotype(pic)
    for p in getPixels(pic):
        blue = getBlue(p)
        red = getRed(p)
        green = getGreen(p)
        if (red < 160):
            setRed(p, red / 2)
        elif (green < 160):
            setGreen(p, green / 3)
        elif (63 <= blue <= 191):
            setBlue(p, blue * 2)
        else:
            setBlue(p, blue * 1.2)
        setRed(p, red * 0.95)
        setGreen(p, green * 0.80)

def chromakey(source, bg, xOffset, yOffset):
    for px in getPixels(source):
        x = getX(px)
        y = getY(px)
        if getRed(px) > 220 and getGreen(px) > 220 and getBlue(px) > 220:
            bgpx = getPixel(bg, x + xOffset, y + yOffset)
            bgcol = getColor(bgpx)
            setColor(px, bgcol)

def collage():
    factor = 2
    pic = makePicture("planet-venus.jpg")
    sign = makePicture("signature3.jpg")
    smW = getWidth(pic) / factor
    smH = getHeight(pic) / factor
    small_pic = makeEmptyPicture(smW, smH)
    canvas = makeEmptyPicture(smW*3, smH*2, black)
    # Top Left
    topLeft = scale(pic, small_pic, factor)
    originalFunction(topLeft)
    copy(topLeft, canvas, 0, 0)
    # Top Right
    topRight = scale(pic, small_pic, factor)
    grayScale(topRight)
    copy(topRight, canvas, smW*2, 0)
    # Bottom Left
    botLeft = scale(pic, small_pic, factor)
    light(botLeft)
    copy(botLeft, canvas, 0, smH)
    # Bottom Right
    botRight = scale(pic, small_pic, factor)
cyanotype(botRight)
copy(botRight, canvas, smW*2, smH)
# Center
center = scale(pic, small_pic, factor)
copy(center, canvas, smW, smH/2)
# Signature
cromakey(sign, canvas, 350, 450)
copy(sign, canvas, 350, 450)
explore(canvas)