第一次作业

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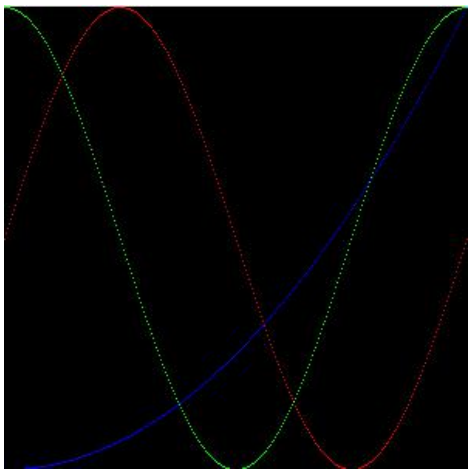
本次作业 1 要求如下:

1. 使用 matlab 写一个函数，img = generateFigure(imgW,imgH)，其作用为产生一幅的彩色图像，图像中用红色显示 [0,2*pi] 的正弦波，用绿色显示[0,2*pi]的余弦波，蓝色显示[0,2*pi]的 y=x^2 图像。

函数如下:

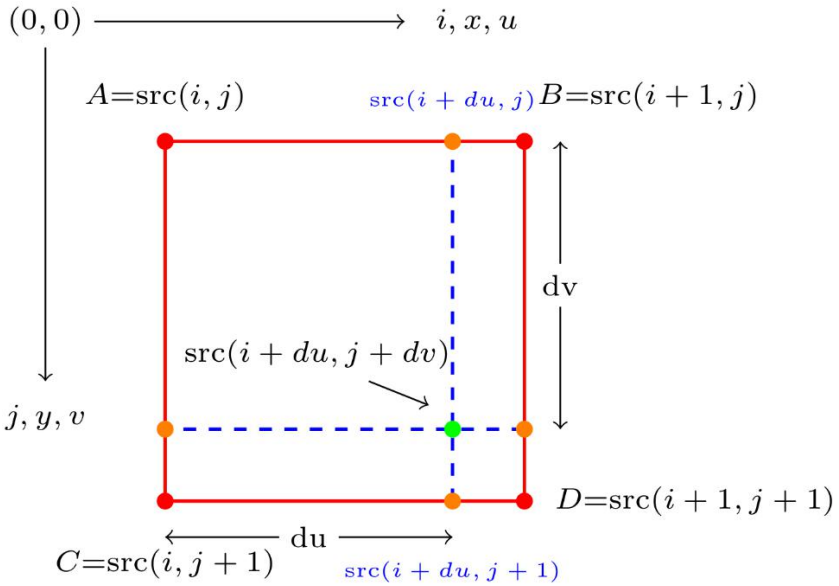
```
function img = generateFigure(imgW,imgH)
    rsin  = zeros(imgH, imgW);
    gcos = zeros(imgH, imgW);
    bfunc = zeros(imgH, imgW);
    x = 1:imgW;
    x = (x-1)/(imgW-1)*2*pi;
    y1 = sin(x);
    y2 = cos(x);
    y3 = x.*x;
    y1 = (-y1+1)/2*(imgH-1)+1;
    y2 = (-y2+1)/2*(imgH-1)+1;
    minV = min(-y3);maxV=max(-y3);
    y3 = (-y3-minV)/(maxV-minV)*(imgH-1)+1;
    x = 1:imgW;
    y1 = round(y1); ind1 = y1+(x-1)*imgH;
    y2 = round(y2); ind2 = y2+(x-1)*imgH;
    y3 = round(y3); ind3 = y3+(x-1)*imgH;
    rsin (ind1) = 1;
    bfunc(ind2) = 1;
    gcos(ind3) = 1;
    img = cat(3, rsin, gcos, bfunc);
end
```

运行结果:



作业 2 要求如下：

2. 不使用 for 循环，实现 bilinear interpolation



线插：

$$\mathrm{src}(i+du, j) = (B-A) \times du + A$$

$$\mathrm{src}(i+du, j+1) = (D-C) \times du + C$$

双线插：

$$\begin{aligned}\mathrm{src}(i+du, j+dv) &= \mathrm{src}(i+du, j) + [\mathrm{src}(i+du, j+1) - \mathrm{src}(i+du, j)] \times du \\ &= (1-du)\cdot(1-dv)\cdot A + (1-dv)\cdot du \cdot B \\ &\quad +(1-du)\cdot dv \cdot C + du \cdot dv \cdot D\end{aligned}$$

```
function outPicture = bilinearTrans(img, factor)
    [imgH, imgW] = size(img);
    height = round(imgH*factor);
    width = round(imgW*factor);
    [X, Y] = meshgrid(1:width, 1:height);
     X_f = (X-1)/(height-1)*(imgH-1)+1;
    Y_f = (Y-1)/(width-1)*(imgW-1)+1;
    du = X_f - floor(X_f);
    dv = Y_f - floor(Y_f);
    A_X = floor(X_f);
    A_Y = floor(Y_f);
    A = A_Y + (A_X-1)*imgH;
    D_X = floor(X_f)+(du>0);
    D_Y = floor(Y_f)+(dv>0);
    D = D_Y + (D_X-1)*imgH;
    B = A_Y + (D_X-1)*imgH;
    C = D_Y + (A_X-1)*imgH;
    outPicture =
(1-du).*(1-dv).*img(A)+(1-dv).*du.*img(B)+(1-du).*dv.
*img(C)+du.*dv.*img(D);
```

```
end
```