信息隐藏技术实验八

李潇逸 2111454

实验要求

1、隐藏：利用二值图像隐藏法，实现将秘密信息（可以是图像、文字等信息）嵌入到位图中；

2、提取：将秘密信息提取出来。

实验原理

二值图像：黑白两种像素组成的图像，1bit 表示存储像素颜色 (0 或 1)。
通常方法：利用图像区域中黑色像素个数相对于区域中全部像素个数的百分比来对秘密信息进行编码。

如果要嵌入 0，需要嵌入后为三黑一白，对应五种情况的处理：全白，不处理视为无效块，一黑，两黑，全黑改为三黑，三黑不用改。如果要嵌入 1，需要嵌入后为一黑三白，对应五种情况的处理：全白，两黑，三黑改为一黑三白，一黑不用改，全黑，视为无效块。

每四个像素点为一块，检测其中黑像素点个数。若是三个黑色，则秘密图像中对应位置为黑色，若是一个黑色（即三个白色），则对应白色。如果是全黑，说明在隐藏时要隐藏白色，如果是全白，说明隐藏时要隐藏黑色。

代码

encode

```
%% encode
clc;
clear;
d = imread("C:\Users\19309\Desktop\document\信息隐藏技术\第八次实验\picture\Xiangling.bmp");
subplot (1, 2, 1); imshow (d, []); title (' 原始图片 ');
secret = 2111454;

for t = 1:24
    s(t) = bitget(secret, t);
end

num = 1;
t = 1;

while t < 24

    if s(t) == 0

        switch (CalculateBlack(d, num))
            case 0
                t = t - 1;
                num = num + 4;
            case 1
                temp = 1;
                startnum = num;

                while temp < 3

                    if d(startnum) == 1
                        d(startnum) = 0;
                        temp = temp + 1;
                        startnum = startnum + 1;
                    end

                end

                num = num + 4;
            case 2
                temp = 2;
                startnum = num;
```

```
            while temp < 3

                if d(startnum) == 1
                    d(startnum) = 0;
                    temp = temp + 1;
                    startnum = startnum + 1;
                end

            end

            num = num + 4;
        case 3
            num = num + 4;
        case 4
            temp = 4;
            startnum = num;

            while temp > 3

                if d(startnum) == 0
                    d(startnum) = 1;
                    temp = temp - 1;
                    startnum = startnum + 1;
                end

            end

            num = num + 4;
    end

else
    a = CalculateBlack(d, num);

    switch a
        case 0
            temp = 4;
            startnum = num;

            while temp > 3

                if d(startnum) == 1
                    d(startnum) = 0;
                    temp = temp - 1;
                    startnum = startnum + 1;
                end
```

```
            end

            num = num + 4;

        case 1
            num = num + 4;
        case 2
            temp = 2;
            startnum = num;

            while temp < 3

                if d(startnum) == 0
                    d(startnum) = 1;
                    temp = temp + 1;
                    startnum = startnum + 1;
                end

            end

            num = num + 4;
        case 3
            temp = 1;
            startnum = num;

            while temp < 3

                if d(startnum) == 0
                    d(startnum) = 1;
                    temp = temp + 1;
                    startnum = startnum + 1;
                end

            end

            num = num + 4;
        case 4
            t = t - 1;
            num = num + 4;
    end

end

t = t + 1;
end
```

```
imwrite(d, 'C:\Users\19309\Desktop\document\信息隐藏技术\第八次实验\picture\encode.bmp', 'bmp')

subplot (1, 2, 2); imshow (d, []); title (' 水印 ');

function out = CalculateBlack(x, i)
    out = 0;
    for a = i : i + 3
        if x(a) == 0
            out = out + 1;
        end
    end
end
```

首先读入图片和秘密信息（学号），之后计算学号的二进制。进入循环，依据原理进行更改对应像素。

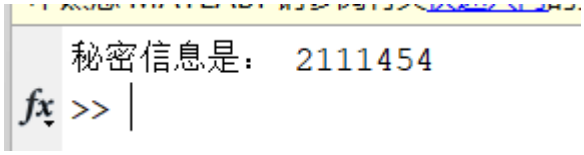
decode

```
%% decode
clc;
clear;
d = imread("C:\Users\19309\Desktop\document\信息隐藏技术\第八次实验\picture\encode.bmp");

for t = 1:24
    s(t) = bitget(0, t);
end

t = 1;
num = 1;

while t < 24
    a = CalculateBlack(d, num);
    switch a
        case 0
            num = num + 4;
        case 1
            s(t) = 1;
            t = t + 1;
            num = num + 4;
        case 3
            s(t) = 0;
            t = t + 1;
            num = num + 4;
        case 4
            num = num + 4;
    end
end

sum = 0;

for t = 1:24
    sum = sum + s(t) * 2^(t - 1);
end

fprintf("秘密信息是：  %d\n", sum);

function out = CalculateBlack(x, i)
    out = 0;
    for a = i : i + 3
        if x(a) == 0
            out = out + 1;
        end
```

```
        end
    end
```

实验结果

加密



提取