西安交通大学

计算机视觉与模式识别

计算机 53 班

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1. 实现 genPyramids1 中的 expand 和 reduce 函数，他们两个的输入都是图像+一个可分离的滤波器 w，利用上课讲的 expand 和 reduce 实现这两个函数。

源代码

```
function after_expand = expand(origin,w)
    [row,col,path] = size(origin);
    expand_temp = zeros(row * 2,col,path);
    for row_con = 1 : row
        for col_con = 1 : col
            for path_con = 1 : path
                expand_temp(row_con * 2,col_con,path_con) =
           origin(row_con,col_con,path_con);
            end
        end
    end
    padding = zeros(1,col,path);
    expand_temp_with_padding =
[padding;padding;expand_temp;padding;padding];
    for col_con = 1 : col
        for row_con = 1 : row * 2
            for path_con = 1:path
                expand_temp(row_con,col_con,path_con) = 2 *
           sum(expand_temp_with_padding(row_con + 2 - 2:row_con
           + 2 + 2,col_con,path_con) .* w');
            end
        end
    end
    after_expand = zeros(row * 2,col * 2,path);
    for row_con = 1:row * 2
        for col_con = 1:col
            for path_con = 1:path
                after_expand(row_con,col_con * 2,path_con) =
           expand_temp(row_con,col_con,path_con);
            end
        end
    end
    padding = zeros(row * 2,1,path);
    after_expand_with_padding = [padding padding after_expand
padding padding];
    for row_con = 1:row * 2
```

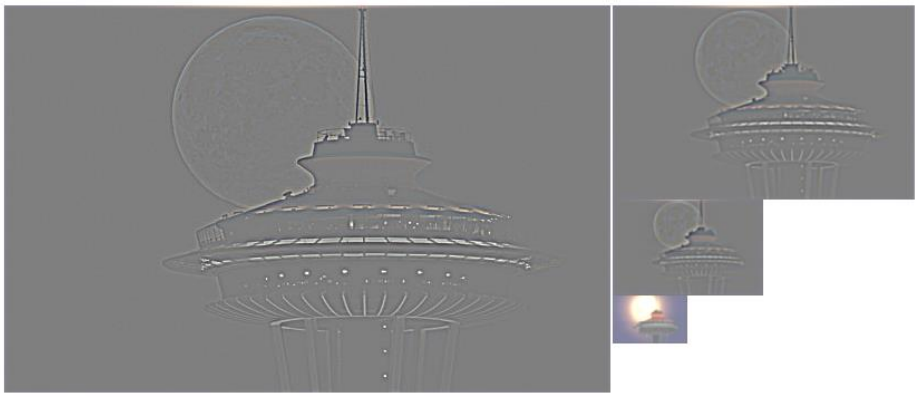
```
        for col_con = 1:col * 2
            for path_con = 1:path
                after_expand(row_con,col_con,path_con) = 2 *
                sum(after_expand_with_padding(row_con,col_con + 2 -
                2:col_con + 2 + 2,path_con) .* w);
            end
        end
    end
end


function after_reduce = reduce(origin,w)
    [row,col,path] = size(origin);
    padding = zeros(row,1,path);
    origin = [padding padding origin padding padding];
    reduce_temp = zeros(row,floor(col / 2),path);
    for row_con = 1:row
        for col_con = 2:2:col
            for path_con = 1:path
                reduce_temp(row_con,floor(col_con / 2),path_con) =
                sum(origin(row_con,col_con + 2 - 2:col_con + 2 +
                2,path_con) .* w);
            end
        end
    end
    [row,col,path] = size(reduce_temp);
    after_reduce = zeros(floor(row / 2),col,path);
    w = w';
    padding = zeros(1,col,path);
    reduce_temp = [padding;padding;reduce_temp;padding;padding];
    for col_con = 1:col
        for row_con = 2:2:row
            for path_con = 1:path
                after_reduce(floor(row_con / 2),col_con,path_con) =
                sum(reduce_temp(row_con + 2 - 2:row_con + 2 +
                2,col_con,path_con) .* w);
            end
        end
    end
end
```

实验结果

高斯金字塔

拉普拉斯金字塔



2. 利用拉普拉斯金字塔进行图像合成（补充 recoverLaplacian 函数）

源代码

```
function imBlend = recoverLaplacian(lapsBlend)
    w = [1/8 1/4 1/4 1/4 1/8];
    [row,~] = size(lapsBlend);
    for laps_con = row:-1:2
        after_expand = expand(lapsBlend{laps_con,1},w);
        after_expand_size = size(after_expand);
        laps_Blend_size = size(lapsBlend{laps_con - 1,1});
        if(after_expand_size(1) < laps_Blend_size(1))
            after_expand =
       vertcat(after_expand,after_expand(end,:,:));
        end
        if(after_expand_size(2) < laps_Blend_size(2))
```

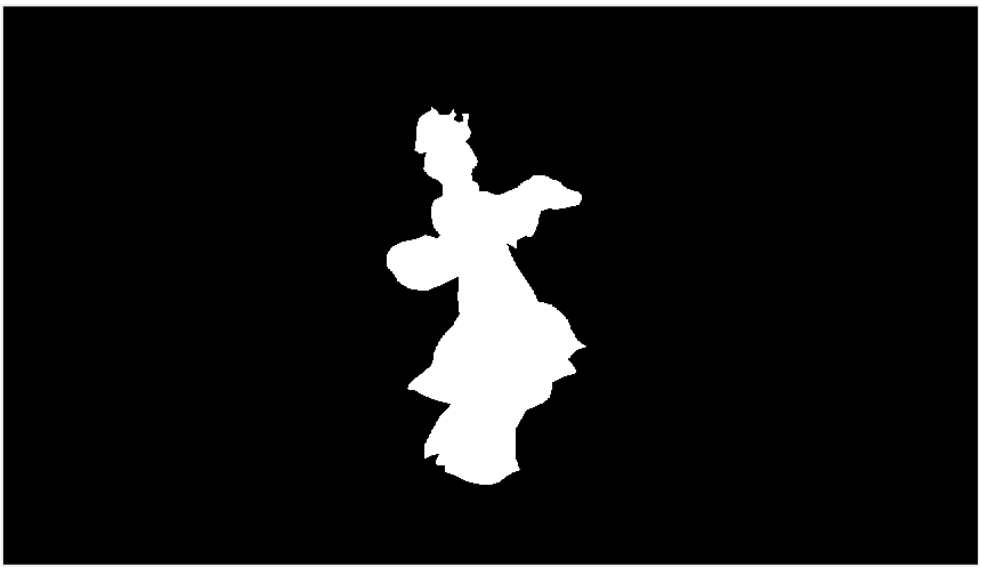
```
            after_expand =
        horzcat(after_expand,after_expand(:,end,:));
         end
         lapsBlend{laps_con - 1,1} = lapsBlend{laps_con - 1,1} +
    after_expand;
end
imBlend = lapsBlend{1,1};
end
```

实验结果

使用 genMask.m 生成 Mask

使用 demo_laplacian_blend.m 进行图像的合成

生成的 Mask



背景图片

Blend 后结果