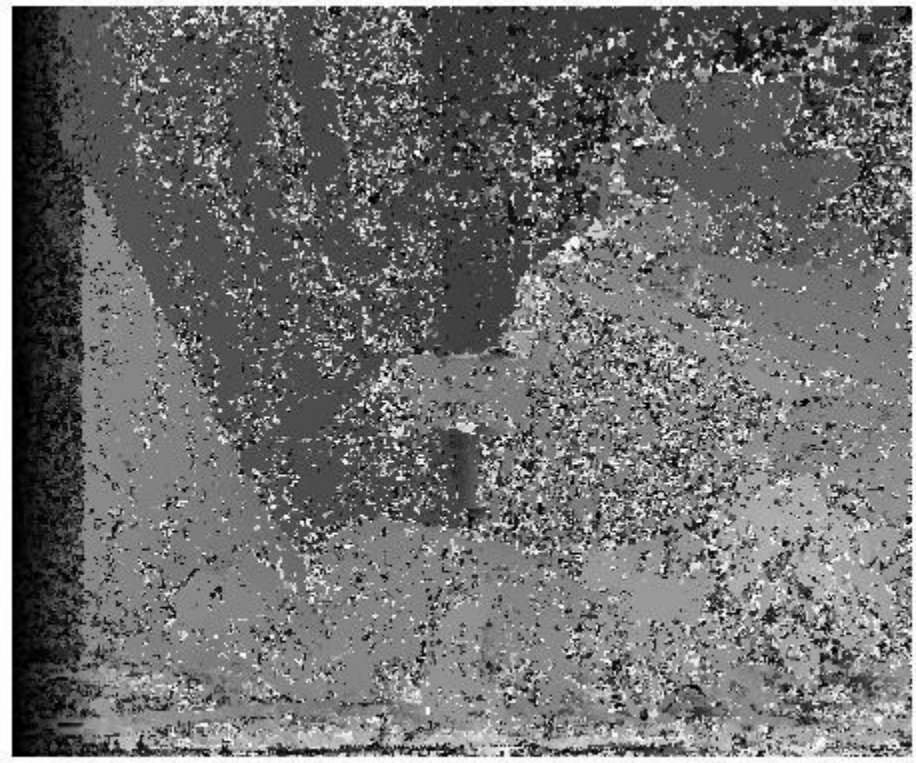
Homework2

CS532: Homework Assignment 2

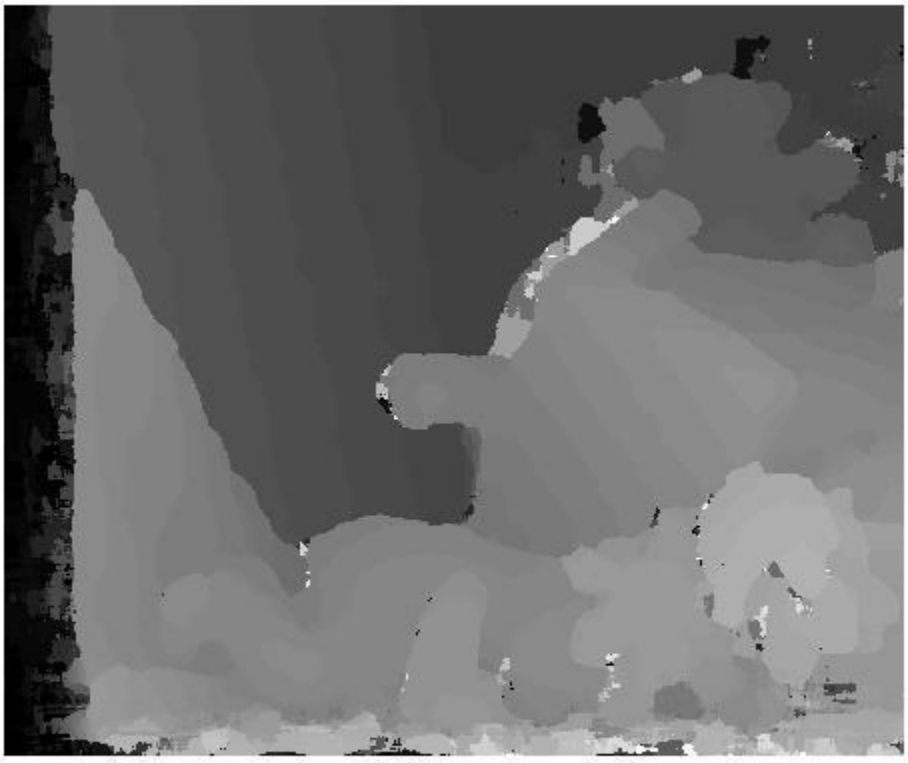
Problem1:

The disparity maps:

For the 3x3 window , the error rate is 48.09% and for the 15x15 window , the error rate is decrease to 22%.



3X3 SAD Window and the error rate is 48.09%



15X15 SAD Window. Error rate = 22%.

Problem 2

The value of PKRN is C2/C1, so when the c2 is equal to c1 that means the number is equal to 1 .These value need to be ignored in this evaluation. Then, using the 50% most confident pixels to compute the error rate and found the error rate is 39.05%.Beside the number of pixels that have been kept is 76880.

Source Code:

```
%Tianpei Luo @cs532 homework2
left=imread('teddyL.pgm');
right=imread('teddyR.pgm');
disp=imread('disp2.pgm');

%get the size of the image
height=size(left,1);
width=size(left,2);
a=[height,width];
display(a);

imshow(left);
%figure,imshow(right);
%figure,imshow(disp);




%implement the rank transform
rank = 5;
rkleftt = zeros(size(left));
rkrightt =zeros(size(right));
half_rk = (rank-1)/2;

for i=1:height
    for j=1:width
        %set lims to avoid out of boundary
        lims = [max(1,i-half_rk);min(height,i+half_rk)
                max(1,j-half_rk);min(width,j+half_rk)];
        %catch the pixel from image in the window size
        lwindow=double(left(lims(1):lims(2),lims(3):lims(4)));
        %compare with the origin pixel and sum the intensity
        rkleftt(i,j) = sum(sum(lwindow<left(i,j)));
        rwindow=double(right(lims(1):lims(2),lims(3):lims(4)));
        rkrightt(i,j) = sum(sum(rwindow<right(i,j)));
    end
end


%implement the SAD stereo matching

window = 3;
%window = 15;
disparities = zeros(size(left));
pkrn = zeros(size(left));

su=zeros(size(left));
c1=zeros(size(left));
c2=zeros(size(left));
half_win=(window-1)/2;
count=0;
for i = 1:height
    for j = 1:width
```

```
        suMin=rank*rank*255;
        c1(i,j)=rank*rank*255;
        c2(i,j)= c1(i,j)+1;
        for d = 0:64
           su(i,j)=0;
           for q =max(1,i-half_win):min(height,i+half_win)
               for p=max(1,j-half_win):min(width,j+half_win)
                  pixLeft = rkleftt(q,p);
                  if p-d<=0
                      pixRight=0;
                  else
                      pixRight=rkrightt(q,p-d);
                  end
                  su(i,j)= su(i,j)+abs(pixLeft-pixRight);
               end
           end
           if su(i,j) < suMin
               suMin = su(i,j);
               disparities(i,j) = d;
           end
           %find out the global minimum of the cost curve c1;

           if su(i,j)<c1(i,j)
               cur = c1(i,j);
               c1(i,j)=su(i,j);
               c2(i,j)=cur;
           else
               if su(i,j) <=c2(i,j)
                   c2(i,j)= su(i,j);
               end
           end
        end
        pkrn(i,j)=c2(i,j)/c1(i,j);
        if pkrn(i,j)==1.0000
            count=count+1;
        end
    end
end
figure,imshow(disparities);


%coumputing errors
disparities = double(disparities);
figure,imshow(disparities,[0 63]);
%caculate the error rate by comparing with the ground true image
ground_t = imread('disp2.pgm');
ground_t = double(ground_t)./4;
err = sum(sum(abs(ground_t-disparities)>1))/(height*width);
display(err);

%PKRN error
% ignored in this evaluation
display(count);

% find the number that is below the top 50%most confidence pixels
pkrn_sort=pkrn(:);
```

```
pkrn_sort=sort(pkrn_sort);
pkrn_sort(1:count)=[];
display(length(pkrn_sort));

middle=pkrn_sort(floor(length(pkrn_sort)/2));

display(middle);

count_1=0;
count_2=0;
for i=1:height
    for j=1:width
        if pkrn(i,j)> middle
            count_1=count_1+1;
           if abs(disparities(i,j)-ground_t(i,j))>1
                count_2=count_2+1;
           end
        end
    end
end

pkrn_err_rate=count_2/count_1;
display(count_1);
display(pkrn_err_rate);
```