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% for report.pdf only
% use No.1 bottle as an example (left to right)


pic = imread('0small.jpg');
pic = im2double(pic);
mask = imread('mask1.jpg');
mask = rgb2gray(mask);
mask = im2double(mask);
[m,n,c] = size(pic);
mask = imresize(mask, [floor(m), floor(n)],'bicubic');
picclear = pic .* mask;

% to find this function, check getWeightMatrix.m
sumvalue = sum(sum(picclear));
summ = 0;
sumn = 0;

for i=1:m
    for j=1:n
        summ = summ + picclear(i,j)*i;
        sumn = sumn + picclear(i,j)*j;
    end
end

centerm = ceil(summ/sumvalue);
centern = ceil(sumn/sumvalue);

K = zeros(m,n);
sigma = 10;
for i=1:m
    for j=1:n
        if (i>=centerm) && (j>=centern)
            K(i,j) = ((i-centerm)/(m-centerm)+(j-centern)/(n-
centern))/2;
        elseif (i>=centerm) && (j<centern)
            K(i,j) = ((i-centerm)/(m-centerm)+(centern-j)/centern)/2;
        elseif (i<centerm) && (j>=centern)
            K(i,j) = ((centerm-i)/centerm+(j-centern)/(n-centern))/2;
        elseif (i<centerm) && (j<centern)
            K(i,j) = ((centerm-i)/centerm+(centern-j)/centern)/2;
        end
    end
end
%  end of getWeightMatrix.m

% to find this function, check blurImg.m
onematrix = ones(m,n);
k1 = 0.06;
k2 = 0.2;
k3 = 0.3;
k4 = 0.31;
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k5 = 0.315;
k6 = 0.32;
k7 = 0.325;
k8 = 0.33;
k9 = 0.335;
k10 = 0.34;
k11 = 0.345;
k12 = 0.35;
k13 = 0.355;
k14 = 0.36;
k15 = 0.365;
k16 = 0.37;
k17 = 0.38;
k18 = 0.39;
k19 = 0.4;

part1 = (K<=k1*onematrix) ;
part1 = part1 .* pic;
mask1 = part1 .* mask;
part2 = (K>=k1*onematrix)&(K<=k2*onematrix) ;
part2 = part2 .* pic;
mask2 = part2 .* mask;
part3 = (K>=k2*onematrix)&(K<=k3*onematrix)  ;
part3 = part3 .* pic;
mask3 = part3 .* mask;
part4 = (K>=k3*onematrix)&(K<=k4*onematrix)  ;
part4 = part4 .* pic;
mask4 = part4 .* mask;
part5 = (K>=k4*onematrix)&(K<=k5*onematrix) ;
part5 = part5 .* pic;
mask5 = part5 .* mask;
part6 = (K>=k5*onematrix)&(K<=k6*onematrix) ;
part6 = part6 .* pic;
mask6 = part6 .* mask;
part7 = (K>=k6*onematrix)&(K<=k7*onematrix) ;
part7 = part7 .* pic;
mask7 = part7 .* mask;
part8 = (K>=k7*onematrix)&(K<=k8*onematrix) ;
part8 = part8 .* pic;
mask8 = part8 .* mask;
part9 = (K>=k8*onematrix)&(K<=k9*onematrix) ;
part9 = part9 .* pic;
mask9 = part9 .* mask;
part10 = (K>=k9*onematrix)&(K<=k10*onematrix) ;
part10 = part10 .* pic;
mask10 = part10 .* mask;
part11 = (K>=k10*onematrix)&(K<=k11*onematrix) ;
part11 = part11 .* pic;
mask11 = part11 .* mask;
part12 = (K>=k11*onematrix)&(K<=k12*onematrix) ;
part12 = part12 .* pic;
mask12 = part12 .* mask;
part13 = (K>=k12*onematrix)&(K<=k13*onematrix) ;
part13 = part13 .* pic;
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mask13 = part13 .* mask;
part14 = (K>=k13*onematrix)&(K<=k14*onematrix) ;
part14 = part14 .* pic;
mask14 = part14 .* mask;
part15 = (K>=k14*onematrix)&(K<=k15*onematrix) ;
part15 = part15 .* pic;
mask15 = part15 .* mask;
part16 = (K>=k15*onematrix)&(K<=k16*onematrix) ;
part16 = part16 .* pic;
mask16 = part16 .* mask;
part17 = (K>=k16*onematrix)&(K<=k17*onematrix) ;
part17 = part17 .* pic;
mask17 = part17 .* mask;
part18 = (K>=k17*onematrix)&(K<=k18*onematrix) ;
part18 = part18 .* pic;
mask18 = part18 .* mask;
part19 = (K>=k18*onematrix)&(K<=k19*onematrix) ;
part19 = part19 .* pic;
mask19 = part19 .* mask;

part20 = (K>=k19*onematrix);
part20 = part20 .* pic;
mask20 = part20 .* mask;

% to find this function, check getGausskernel.m
Gausskernel = getGausskernel(3,10);
% end of getGausskernel.m
part1=conv2(part1,Gausskernel,'same');
mask1=conv2(mask1,Gausskernel,'same');

Gausskernel = getGausskernel(9,10);
part2=conv2(part2,Gausskernel,'same');
mask2=conv2(mask2,Gausskernel,'same');

Gausskernel = getGausskernel(11,10);
part3=conv2(part3,Gausskernel,'same');
mask3=conv2(mask3,Gausskernel,'same');

Gausskernel = getGausskernel(11,10);
part4=conv2(part4,Gausskernel,'same');
mask4=conv2(mask4,Gausskernel,'same');

Gausskernel = getGausskernel(11,10);
part5=conv2(part5,Gausskernel,'same');
mask5=conv2(mask5,Gausskernel,'same');

Gausskernel = getGausskernel(13,10);
part6=conv2(part6,Gausskernel,'same');
mask6=conv2(mask6,Gausskernel,'same');

Gausskernel = getGausskernel(13,10);
part7=conv2(part7,Gausskernel,'same');
mask7=conv2(mask7,Gausskernel,'same');
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Gausskernel = getGausskernel(13,10);
part8=conv2(part8,Gausskernel,'same');
mask8=conv2(mask8,Gausskernel,'same');

Gausskernel = getGausskernel(15,10);
part9=conv2(part9,Gausskernel,'same');
mask9=conv2(mask9,Gausskernel,'same');

Gausskernel = getGausskernel(15,10);
part10=conv2(part10,Gausskernel,'same');
mask10=conv2(mask10,Gausskernel,'same');

Gausskernel = getGausskernel(15,10);
part11=conv2(part11,Gausskernel,'same');
mask11=conv2(mask11,Gausskernel,'same');

Gausskernel = getGausskernel(17,10);
part12=conv2(part12,Gausskernel,'same');
mask12=conv2(mask12,Gausskernel,'same');

Gausskernel = getGausskernel(17,10);
part13=conv2(part13,Gausskernel,'same');
mask13=conv2(mask13,Gausskernel,'same');

Gausskernel = getGausskernel(17,10);
part14=conv2(part14,Gausskernel,'same');
mask14=conv2(mask14,Gausskernel,'same');

Gausskernel = getGausskernel(19,10);
part15=conv2(part15,Gausskernel,'same');
mask15=conv2(mask15,Gausskernel,'same');

Gausskernel = getGausskernel(19,10);
part16=conv2(part16,Gausskernel,'same');
mask16=conv2(mask16,Gausskernel,'same');

Gausskernel = getGausskernel(19,10);
part17=conv2(part17,Gausskernel,'same');
mask17=conv2(mask17,Gausskernel,'same');

Gausskernel = getGausskernel(21,10);
part18=conv2(part18,Gausskernel,'same');
mask18=conv2(mask18,Gausskernel,'same');

Gausskernel = getGausskernel(21,10);
part19=conv2(part19,Gausskernel,'same');
mask19=conv2(mask19,Gausskernel,'same');

Gausskernel = getGausskernel(21,10);
part20=conv2(part20,Gausskernel,'same');
mask20=conv2(mask20,Gausskernel,'same');
```

```
picblur =
 part1+part2+part3+part4+part5+part6+part7+part8+part9+part10;
picblur = picblur
+part11+part12+part13+part14+part15+part16+part17+part18+part19+part20;

maskblur =
 mask1+mask2+mask3+mask4+mask5+mask6+mask7+mask8+mask9+mask10;
maskblur = maskblur
+mask11+mask12+mask13+mask14+mask15+mask16+mask17+mask18+mask19+mask20;
% end of blurImg.m

% to find this function, check focusNum.m
trans = 1 - maskblur;
picblur = picblur .* trans;
picclear = pic .* maskblur;
output = picclear + picblur;
output = imresize(output, [floor(m*6), floor(n*6)],'bicubic');
figure(1),imshow(output);
% end of focusNum.m

##: ################ 17% ##
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