



# Image Processing

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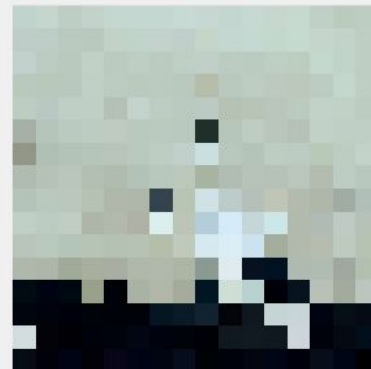


# Our Approach

```
for s=1
    g=[];
    for k=5 %pick frame inside cover
        if k<10
            T={'airplane0'};
        else
            T={'airplane'};
        end
        a=imread([T{s},int2str(k),'.tif']);
        img=a;

    for j=1:16
        for i=1:16
            A=img((i-1)*16+1:(i-1)*16+16,(j-1)*16+1:(j-1)*16+16,:);
            rimg=reshape(A,[],3);

            [uA,~,uIdx]=unique(rimg,'rows','stable');
            modeIdx=mode(uIdx);
            modeRow=uA(modeIdx,:);
            whereIdx=find(uIdx==modeIdx);
            g=[g;modeRow];
        end
    end
```



# Collages of Cover Types

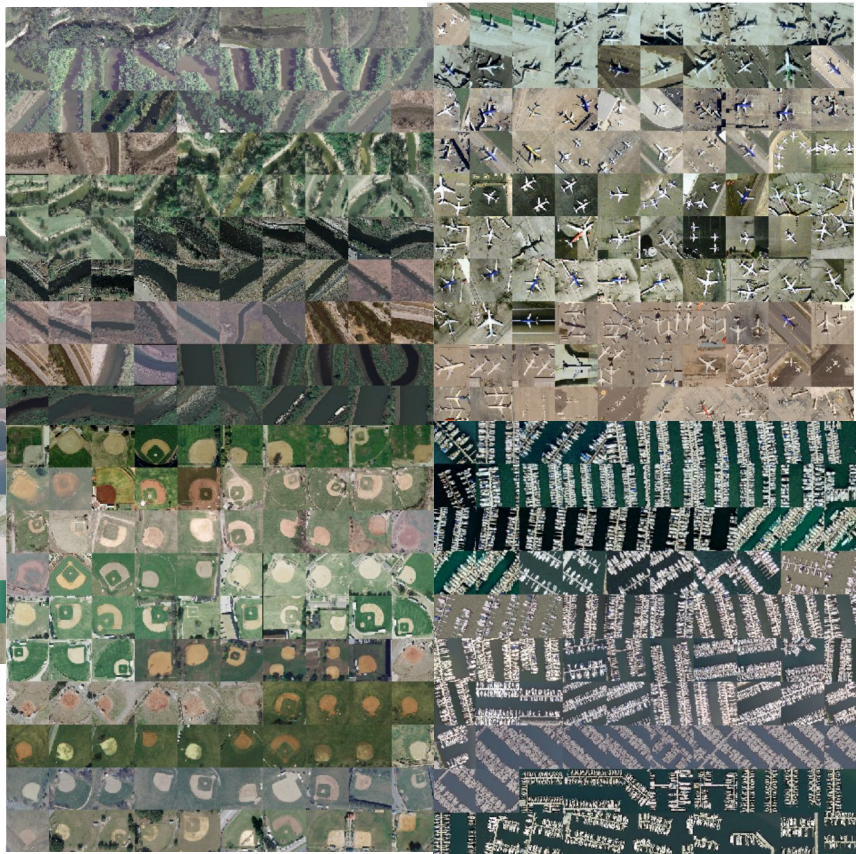
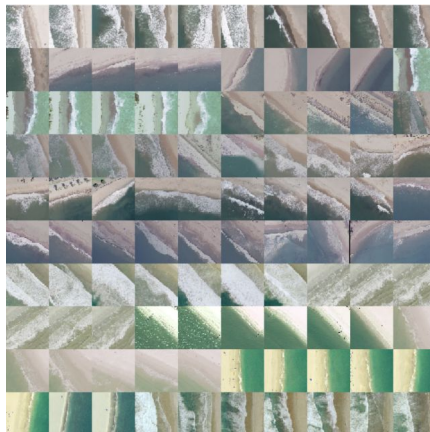
River

Baseball Diamond

Beach

Harbor

Airplane



```
imds=imageDatastore('airplane*');  
montage(imds,'Size',[10 10]);
```

# Training

```
%% Harbor: averages of rgb for 16x16 common color image
direction='./harbor/';
harbordir=dir([direction '*.tif']);
for m=1:51
    e=[];
    t=strcat(direction,harbordir(m).name);
    a=imread(t);
    img=a;
    for j=1:16
        for i=1:16
            A=img((i-1)*16+1:(i-1)*16+16,(j-1)*16+1:(j-1)*16+16,:);
            rimg=reshape(A,[],3);

            [uA,~,uIdx]=unique(rimg,'rows','stable');
            modeIdx=mode(uIdx);
            modeRow=uA(modeIdx,:);
            whereIdx=find(uIdx==modeIdx);
            e=[e;modeRow];
        end
    end
    fprintf("%d\n", sum(e(:)))
end
```

# Testing

```
%% %% Run river images 51-99 and see what they identify as when compared to the averages found previously
```

```
rivercount=0;
airplanecount=0;
bballcount=0;
beachcount=0;
harborcount=0;
direction='./harbor/';
harbordir=dir([direction '*.tif']);
for m=51:99
    f=[];
    t=strcat(direction,harbordir(m).name);
    a=imread(t);
    img=a;

    for j=1:16
        for i=1:16
            A=img((i-1)*16+1:(i-1)*16+16,(j-1)*16+1:(j-1)*16+16,:);
            rimg=reshape(A,[],3);

            [uA,~,uIdx]=unique(rimg,'rows','stable');
            modeIdx=mode(uIdx);
            modeRow=uA(modeIdx,:);
            whereIdx=find(uIdx==modeIdx);
            f=[f;modeRow];
        end
    end
end
```



# Testing Pt 2

```
fprintf("rgb sum unknown = %d\n", sum(f(:)));
riverfinalcount=abs(averageriver-sum(f(:)));
airplanefinalcount=abs(averageairplane-sum(f(:)));
baseballfinalcount=abs(averagebaseball-sum(f(:)));
beachfinalcount=abs(averagebeach-sum(f(:)));
harborfinalcount=abs(averageharbor-sum(f(:)));
% Whichever difference is the smallest between the average and unknown
% image a count will be added to index
[xmin,ind]=min([riverfinalcount, airplanefinalcount,baseballfinalcount,beachfinalcount,harborfinalcount]);
if ind==1
    fprintf('Unknown image is a river\n')
    rivercount=rivercount+1;
elseif ind==2
    fprintf('Unknown image is an airplane\n')
    airplanecount=airplanecount+1;
elseif ind==3
    fprintf('Unknown image is a baseball diamond\n')
    bballcount=bballcount+1;
elseif ind==4
    fprintf('Unknown image is a beach\n')
    beachcount=beachcount+1;
elseif ind==5
    fprintf('Unknown image is a harbor\n')
    harborcount=harborcount+1;

end
end
```

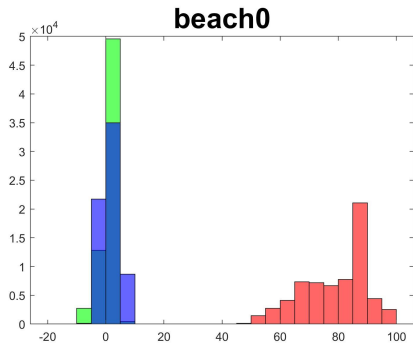
# Confusion Matrix

True Class	Airplane	24	6	14	3	3
	Baseball Diamond	12	22	2	2	12
	Beach	23		21		6
	Harbor	17	5	5	12	11
	River	1	23		6	20
		Airplane	Baseball Diamond	Beach	Harbor	River
		Predicted Class				

# Other approaches

```
%% Filter for Beach
```

```
m3 = zz;  
r = m3(:,:,1);  
g = m3(:,:,2);  
b = m3(:,:,3);  
r=double(r(1));  
g=double(g(1));  
b=double(b(1));  
x = (r-187).^2+(g-162).^2+(b-155).^2;  
beachfilter = x;
```



```
T={'airplane0','baseballdiamond0','beach0','harbor0','river0'};
```

```
for k=1:8
```

```
    x=imread([T{k},num2str(0)],'tif');
```

```
    C=rgb2lab(x);
```

```
    r=C(:,:,1);
```

```
    g=C(:,:,2);
```

```
    b=C(:,:,3);
```

```
    figure
```

```
    histogram(r,'facecolor','r','binwidth',5)
```

```
    hold
```

```
    histogram(g,'facecolor','g','binwidth',5)
```

```
    histogram(b,'facecolor','b','binwidth',5)
```



*Thank you!*