

Documentation on
Teaching with Real-time Application

**Topic : Satellite Image
classification using
Machine Learning**

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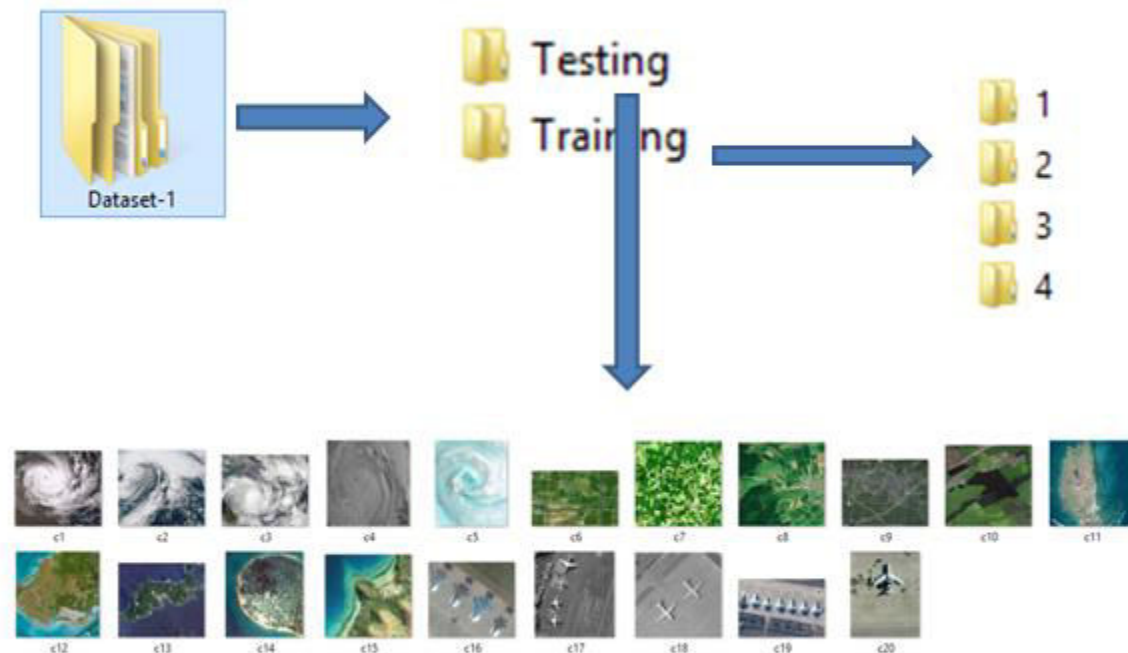
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Data Base

Data preparation (also referred to as “data preprocessing”) is the process of transforming raw data so that data scientists and analysts can run it through machine learning algorithms to uncover insights or make predictions. Most machine learning algorithms require data to be formatted in a very specific way, so datasets generally require some amount of preparation before they can yield useful insights. Some datasets have values that are missing, invalid, or otherwise difficult for an algorithm to process. If data is missing, the algorithm can’t use it. If data is invalid, the algorithm produces less accurate or even misleading outcomes. Some datasets are relatively clean but need to be shaped (e.g., aggregated or pivoted) and many datasets are just lacking useful business context (e.g., poorly defined ID values), hence the need for feature enrichment. Good data preparation produces clean and well-framed data .

Satellite Images of four classes are considered. In each class 20 images are used for training and 5 images are used for testing.



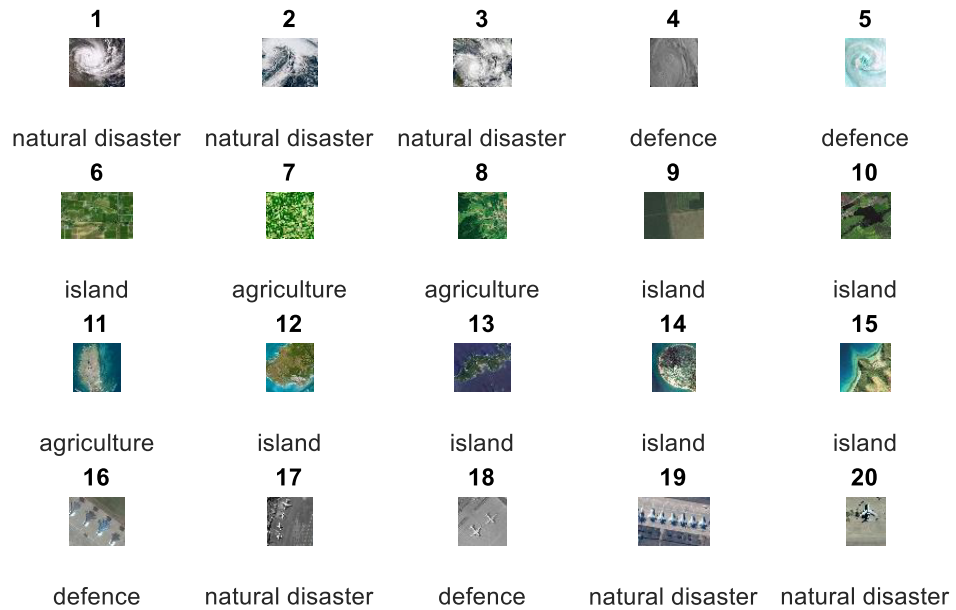
Decision tree model developed after training

During training 80 images mean and rms values are computed in matlab. Based on the values decision tree model developed is given below:

```
if((b>=100)&(b<=200))%ND or Def
    disp('natural disaster or defence');
    if(c>=15.9672)
        disp('defence');
        xlabel('defence');
    else
        disp('natural disaster');
        xlabel('natural disaster');
    end
end
if((b>=50)&(b<100))
    disp('agriculture or island');
    if((c>=14.9844))
        disp('island');
        xlabel('island');
    else
        disp('agriculture');
        xlabel('agriculture');
    end
end
end
end
```

Testing results - classification

During testing 20 images mean and rms values are computed in matlab. Based on the values classified images are given below: Some are classified correctly. some are wrongly classified. We can compute accuracy, precision, and recall.

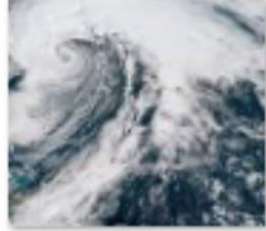


Usage of default command in matlab

Simple Case to understand: Four images are used for training.
Two images are used for testing.



c1



c2



c7



c8

Testing



c3



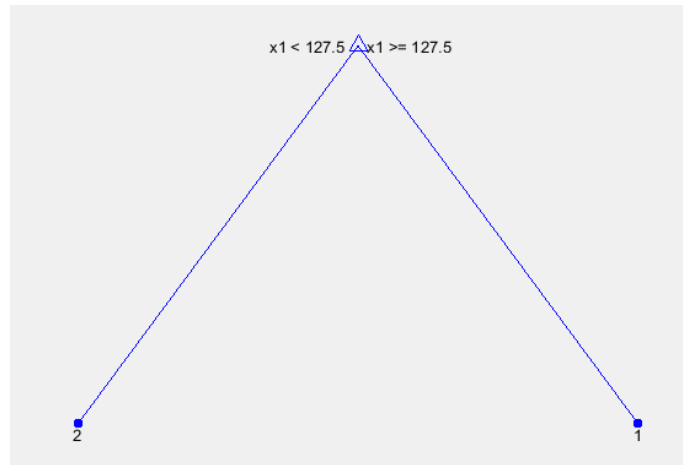
c10

Usage of default command in matlab-Training

```
a1=imread('c1.jpg');
a1=rgb2gray(a1);
a1m=mean(mean(a1));
a1r=rms(rms(a1));
a2=imread('c2.jpg');
a2=rgb2gray(a2);
a2m=mean(mean(a2));
a2r=rms(rms(a2));
a3=imread('c7.jpg');
a3=rgb2gray(a3);
a3m=mean(mean(a3));
a3r=rms(rms(a3));
a4=imread('c8.jpg');
a4=rgb2gray(a4);
a4m=mean(mean(a4));
a4r=rms(rms(a4));
%% %% Training Side
data = [135 16;
        155 16;
        120 16;
        90 16];
target = [1;1;2;2];
% create a decision tree
dtree = fitctree(data,target,'MinParentSize',2);
view(dtree,'mode','graph')
save('dtree.mat','dtree');
```

Usage of default command in matlab-DT

Decision Tree Constructed



Usage of default command in matlab-Testing

```
%% Testing Side
% for testing load the trained model
load('dtree.mat');
a5=imread('c3.jpg');
a5=rgb2gray(a5);
a5m=mean(mean(a5));
a5r=rms(rms(a5));
testdata = [167 16]; % take 1 new unknown
observation and give to trained model
Group = predict(dtree, testdata);
disp(Group)
```

Result: Group - 1

Clear Goals of this work:

- 1. To give depth in knowledge on Decision trees**
- 2. To give hands on exposure on Matlab**
- 3. To expose to real-time applications**

For any queries/feedback kindly contact

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