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EE 308 Assignment - Llyod max quantizer

Used the iterative convergence method. First randomly initialized thresholds, and using the expressions for the interval limits in the sample space, we can then calculate interval limits. On iterating this procedure, and checking convergence on the difference betwee v(t-1) and v(t) threshold vectors, we can find the most optimal set of the intervals and corresponding thresholds. Below is described the llyod max quantizer function written in matlab. The function file will be called in the mainscript file, and convergence of the threshold values is plotted as an error function.

Inputs to the function

The function can be called as follows -: llyod_max(levels,max_l,min_l,mu,sigma); Here max_l and min_l are the maximum and minimum values amongst the values that we need to quantize. Since we have assumed a gaussian pdf as specified in the question, we are taking only mu and sigma as the parametres and constructing the pdf in the function. Giving default values to the parameters for executing -:

```
levels=6;
max_l = inf;
min_l = -inf;
mu = 0;
sigma = 2;

[v,m,x,er] = llyod_max(levels,max_l,min_l,mu,sigma);

% The values of the threshold v and the interval limits m are as
 follows-:

disp('Thresholds');
disp(v);
disp('Interval Boundaries');
disp(m);
```

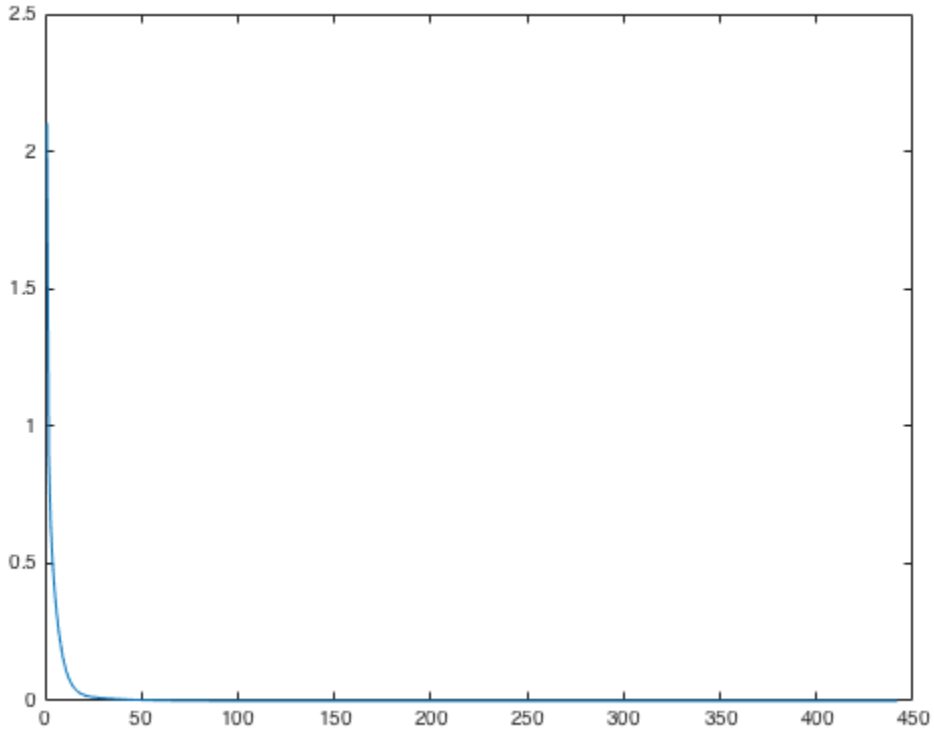
```
Thresholds
   -3.7872
   -2.0002
   -0.6354
    0.6354
    2.0002
    3.7872

Interval Boundaries
      -Inf
```

```
-2.8937
-1.3178
 0.0000
 1.3178
 2.8937
    Inf
```

Plot of error vs number of iterations

Number of iterations on x-axis and error on y-axis

```
figure
plot(x,er);
```



Conclusion

Hence we see that the quantizer converges efficiently.

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