

Project 1. Image Filtering and Fourier Transform

Submitted By:-Harshdeep Singh Chawla

I. INTRODUCTION

This project, can be divided into three parts. The first part is about Implement k-means clustering and use it to perform image segmentation. The second section is about Generate color histogram features and use them for image retrieval. And the third section is about Generate texture features and use them for texture matching.

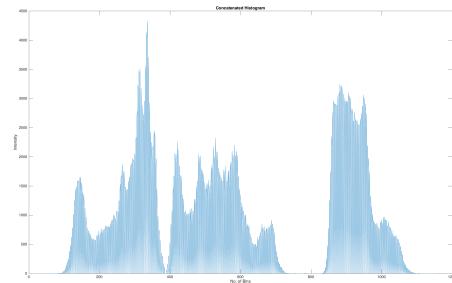


Figure 3. Concatenated Histogram

II. COLOR IMAGE SEGMENTATION USING K-MEANS

A. Color Histogram.

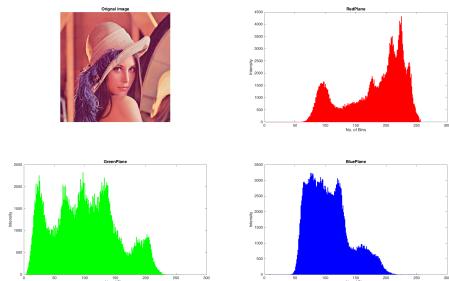


Figure 1. RGB Histogram Channels

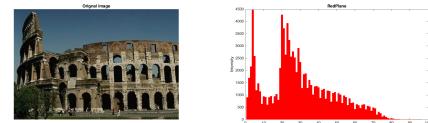


Figure 4. 96 bin Quantized color Histogram

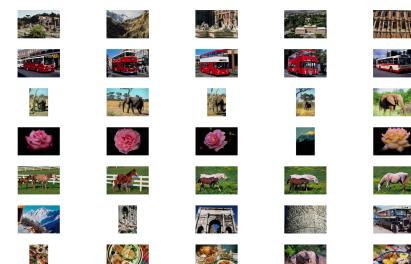


Figure 5. Images Retrieved from different classes

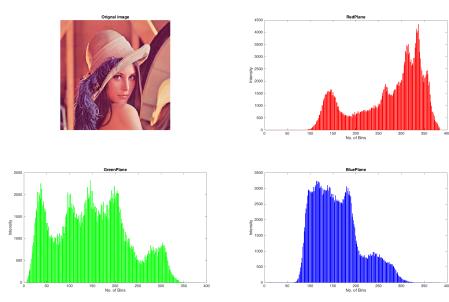


Figure 2. RGB 384 bins Quantized color histogram



Figure 6. Images retrieved from class 1



Figure 7. Images retrieved from class 2



Figure 11. Images retrieved from class 6

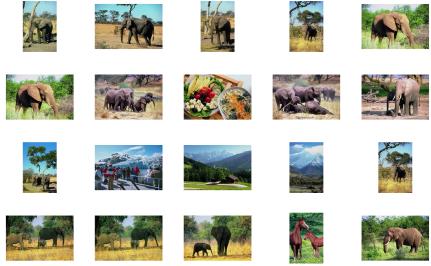


Figure 8. Images retrieved from class 3

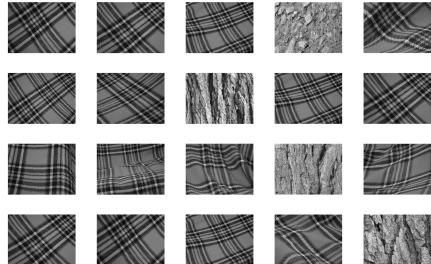


Figure 12. Image retrieved from class 6



Figure 9. Images retrieved from class 4



Figure 10. Images retrieved from class 5

B. K-means Implementation.**C. K-means Segmentation based on Intensity.****D. K-means Segmentation based on Color.****E. Comparison of Segmentation based on Intensity and Color.****III. IMAGE RETRIEVAL USING COLOR HISTOGRAM FEATURES.****A. Computing 96 bin Quantized Color Histogram.****B. Retrieval of Image using Histogram Intersection Distance.****C. Results and Advantages/Disadvantages.****IV. IMAGE RETRIEVAL USING TEXTURE FEATURES.****A. 9-D Texture Feature based on Law's Filter Masks.****B. Image Retrieval using Chi Squared Distance of the feature vectors.****C. Results and Advantages/Disadvantages.****V. TEXTURE MATCHING USING GABOR TEXTURE FEATURES.****A. Compute Texture Features based on Gabor Filters.****B. Gabor Filters and their Frequency Responses.****C. Image Retrieval using Chi Squared Distance of the feature vectors.****D. Results and Advantages/Disadvantages.****VI. CONCLUSION**

In this project, we were required to become familiar with various functions of the Matlab that are used for image

Harshdeep Singh Chawla, Department of Computer Engineering, Rochester Institute of Technology, Rochester, NY 14623, USA (e-mail: hxc3427@g.rit.edu).

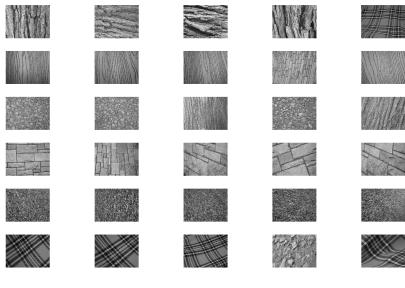


Figure 13. Images retrieved from different classes

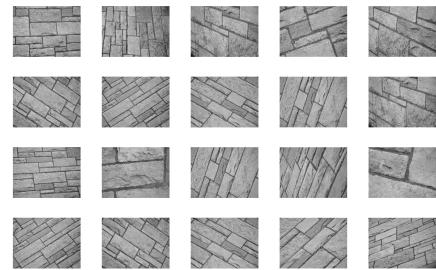


Figure 17. Image retrieved from class 4

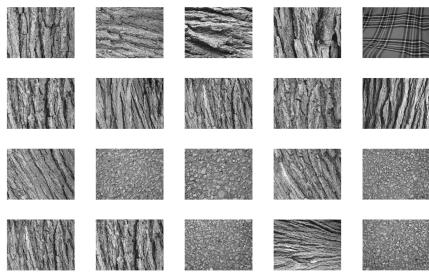


Figure 14. Image retrieved from class 1

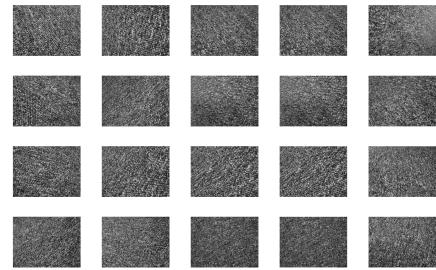


Figure 18. Image retrieved from class 5

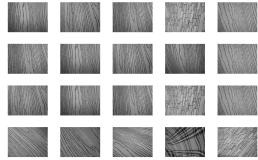


Figure 15. Image retrieved from class 2

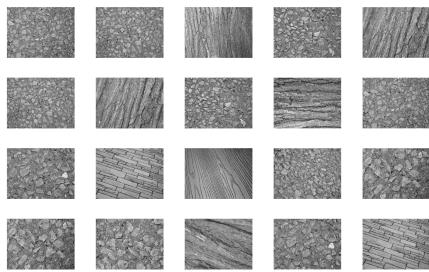


Figure 16. Image retrieved from class 3

processing. Image segmentation, and retrieval of images of same kind from the entire database was done and functions used were observed closely. All the questions asked were answered according to the result obtained. And the the main objective of this image was fulfilled.

ACKNOWLEDGMENT

I would like to thank Professor Andreas Savakis for giving me this project. This project helped me in clearing my doubts

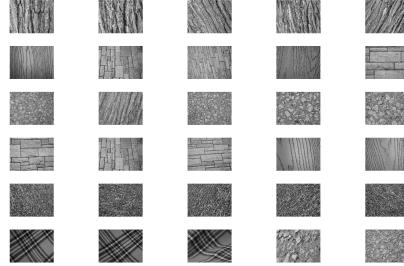


Figure 19. Image retrieved by changing the image size to half

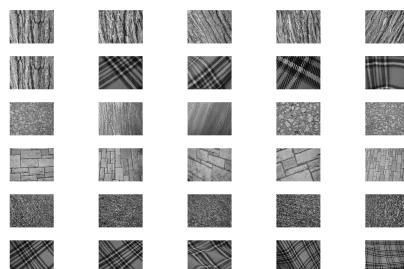


Figure 20. Image retrieved by changing the image size to twice

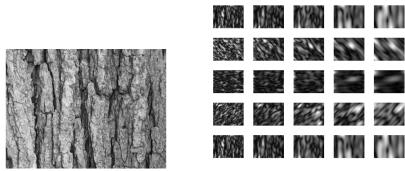


Figure 21. Original image and it's feature

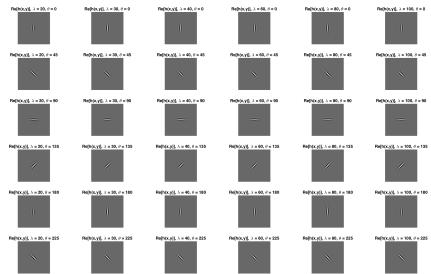


Figure 22. Gabor filter with various wavelength and orientation

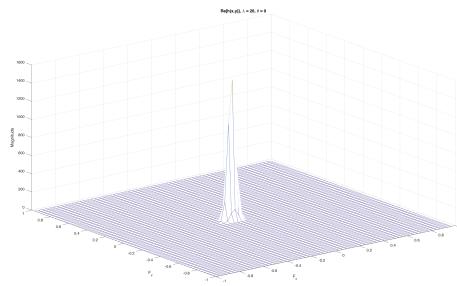


Figure 23. Frequency response of gabor filter

and understanding filtering,DFT and image reconstruction in detail. I would also like to thank Professor's TA who helped me during the project.