

Analysis of Skin Cancer Image Processing Using MATLAB

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Abstract— This paper focuses on the feature extraction, feature selection, feature reduction, classification the skin cancer images and analysis of skin cancer images for images retrieval which will aid for computer assisted diagnosis. Skin cancer images have been collected from the dermatology. Pre-processing steps is necessary to improve the quality of image. The preprocessing steps are grayscale transformation to eliminate the hue, resize the image and filtering the image. Vector Quantization (VQ) method is used to reduce the texture image feature values and edge image feature values. This analysis contains the Non-melanoma and Melanoma of skin cancer images. The statistical tool is used to measure the similarity between the analysis of image feature values and the query image feature values. If match with combined image feature values and query image feature values, the query image is retrieved as the resultant image. If the query image feature values do not match with the stored image feature values, it will be considered as the new image to the analysis of the system. This decision making step is developed by using MATLAB.

Keywords— Preprocessing, Feature Extraction, Vector Quantization, MATLAB.

1 INTRODUCTION

The skin cancer is the most common form of cancer in medical field, with the incidence increasing considerably.

Skin cancers may be categorized into two major groups: Melanoma and Non-melanoma skin cancers. Since images represent an essential component of the diagnosis, it is natural to use medical images to support browsing and querying of medical images. Different methods of data mining have been used to detect and classify the skin cancer image such as textural method; most of them used feature extracted using image processing techniques.

Most of computer aided methods proved to be the powerful tool that assist the radiologist to speed up the treatment process. Classification process typically involves two phase: analyzing and testing phase. In analyzing, the properties of typical image features are based on the original image converts grayscale, adjust the image size and filtering the image using unsharp filter. In testing phase, test image's feature values matched with analysis image's feature values. Symptoms of skin cancer image's features are also described to accurate the test image. MATLAB provides an excellent testing system, with its image processing toolbox, and high level programming methodologies.

2 SYSTEM OVERVIEW

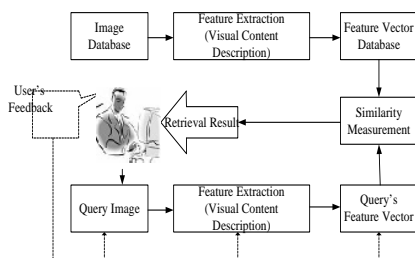
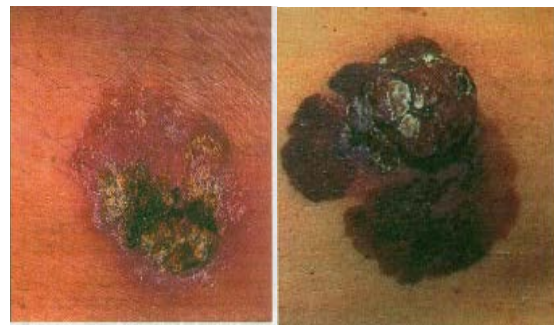


Fig. 1. System Block

3 SYMPTOMS OF SKIN CANCER IMAGES

Skin cancer images may be categorized into two major groups: Melanoma and Non-melanoma skin cancers images. Clinical warning signs of melanoma are enlargement of a pre-existing mole, itching or pain in a pre-existing mole, development of a new pigmented lesion during adult life, irregularity of the borders and variegation of the color within a pigmented lesion. Clinical warning signs of non-melanoma are firm and indient with a central black eschar, round nodule, large size, dome shaped dark hyperkeratosis and irregular margin. Skin cancer images show in Figure 2.



(a) Non-Melanoma (b) Melanoma

Fig.2. Non-Melanoma and Melanoma Skin Cancer Image

4 IMPLEMENTATION OF SKIN CANCER IMAGES PROCESSING

The design of the skin cancer images preprocessing, feature extraction, feature reduction and test the skin cancer images by using MATLAB.

4.1 Preprocessing of Skin Cancer Images

The preprocessing step consists of the four steps as shown in Figure 3. The result of grey scale image as shown in Figure 4 and the result of filtering image after resizing (100,100) as shown in Figure 5.

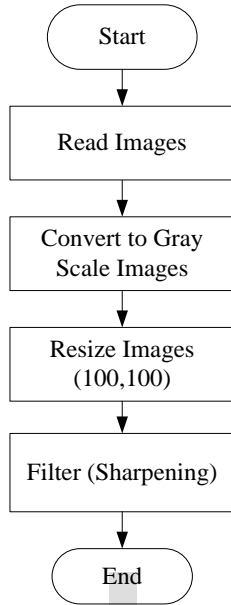


Fig.3. Preprocessing of Skin Cancer Images

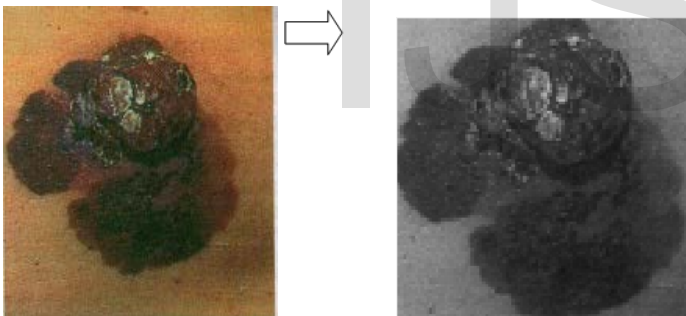


Fig. 4. Convert the Melanoma Skin Cancer Image into Gray-scale

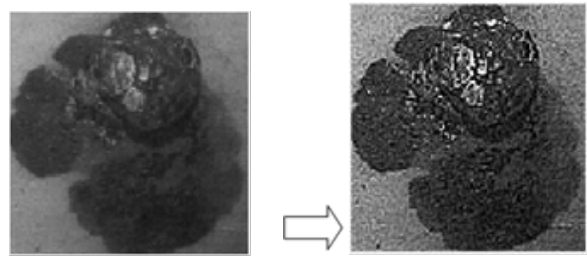


Fig.5. Grayscale of Melanoma Skin Cancer Image Convert into Filtering Image

4.2 Feature Extraction of Skin Cancer Images

In this part, the extract of skin cancer image feature combined with six factors. The feature extraction program is also described in Figure 6.

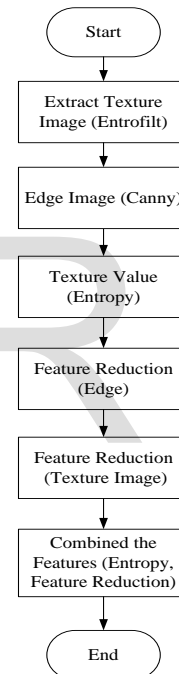
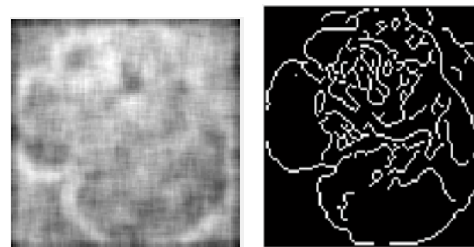


Fig.6. Flowchart of Feature Extraction
They are extract the texture image using entrofilt as shown in Figure 7(a), edge image using canny method as shown in Figure 7(b), extract texture value using entropy, feature reduction (Edge image), feature reduction (texture image) and combined features.



(a) Texture Image (b) Edge Detection Image

Fig.7. Melanoma Skin Cancer Image (a) Texture Image

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4.3 Texture Value (Entropy)

The image histogram may be considered a probability distribution over pixel values. Entropy is a statistical measure of randomness that can be used to characterize the texture of the input image. The entropy function treats it as a multidimensional grayscale image and not as an RGB image. Entropy converts any class other than logical to uint8 for the histogram count calculation so that the pixel values are discrete and directly correspond to a bin value. The unit of entropy is bits when using logarithms to base 2.

When all intensities occur with equal frequency and corresponding to a uniform histogram, the entropy has a maximum value. It has a minimum value of 0 when all pixels have the same intensity. The entropy is one measure of the information content of an image. Because it is calculated from the histogram, it is unable to take spatial factors into consideration.

4.4 Feature Reduction

The feature reduction of vector quantization method used for reduces the texture image feature values and edge image feature values. And then these feature reduction values and texture values are combined in (.mat) file for testing images.

4.5 System Flow Chart

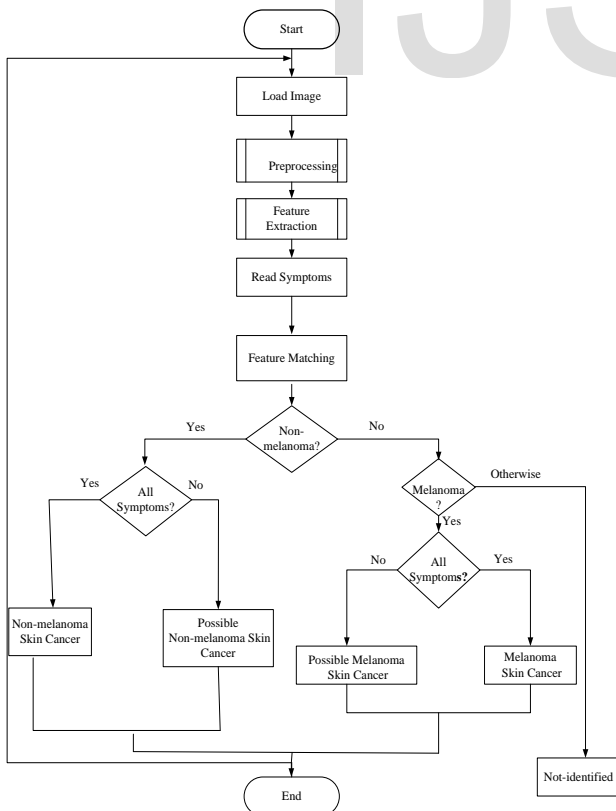


Fig.8. Flow Chart For Test Image

5 TESTS AND RESULTS

5.1 Simulation Result of Analysis in Skin Cancer Images

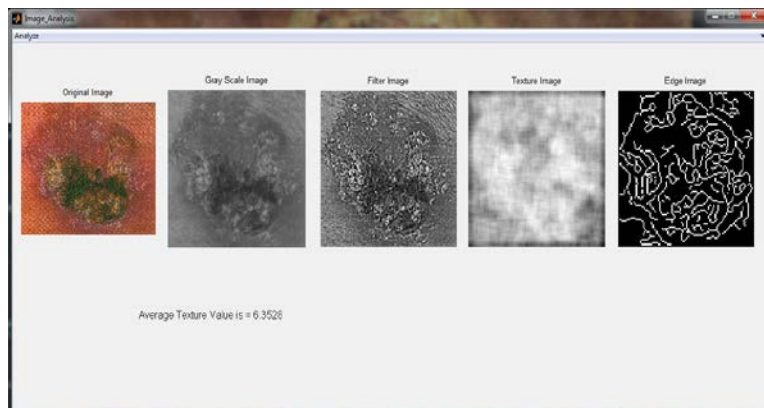


Fig.9. Simulation Result of Analysis in Non-Melanoma Skin Cancer Image

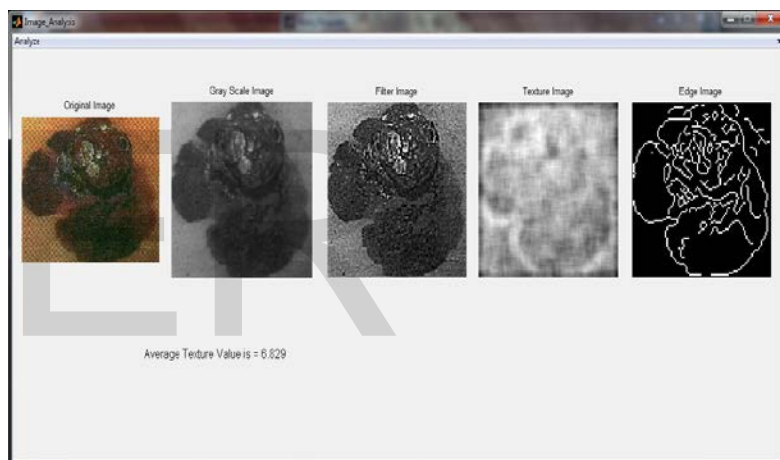
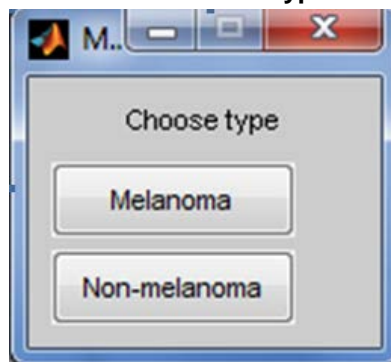


Fig.10. Simulation Result of Analysis in Melanoma Skin Cancer Image

5.2 Simulation Result of Choose Type



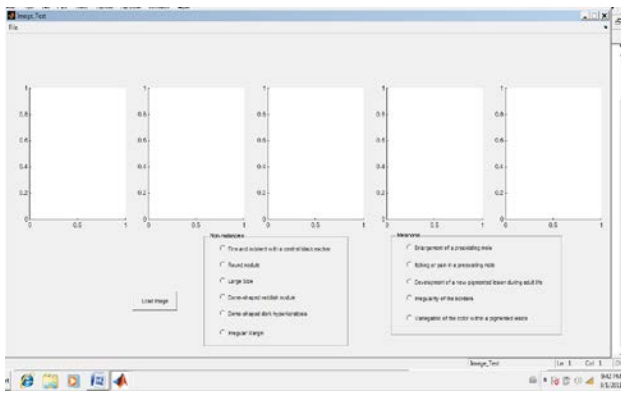


Fig.11. First Step of Loading Input Image

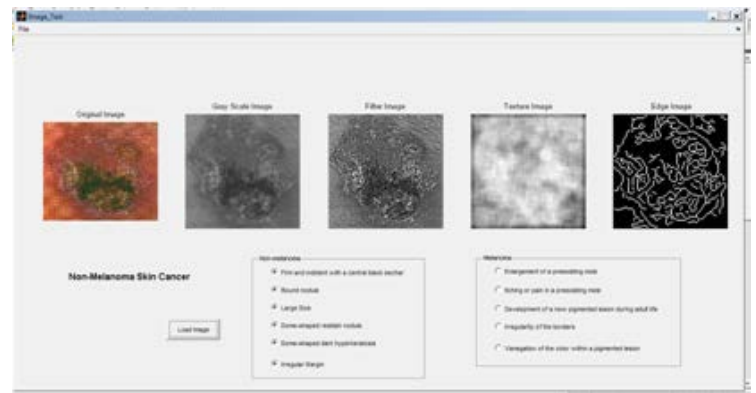


Fig.15. Non-melanoma Result of Tested Image

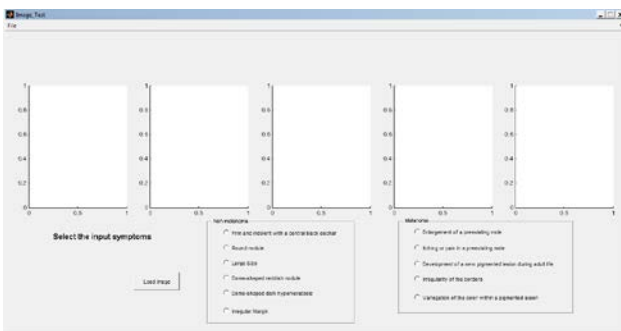


Fig.12. Selected Input Image Symptoms

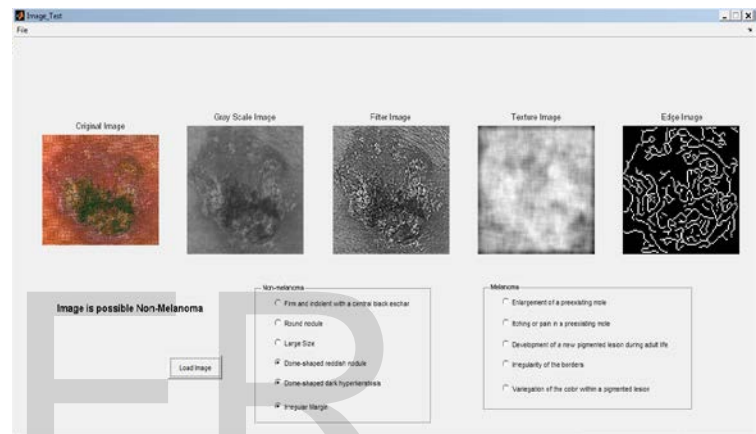


Fig.16. Possible Non-melanoma Result

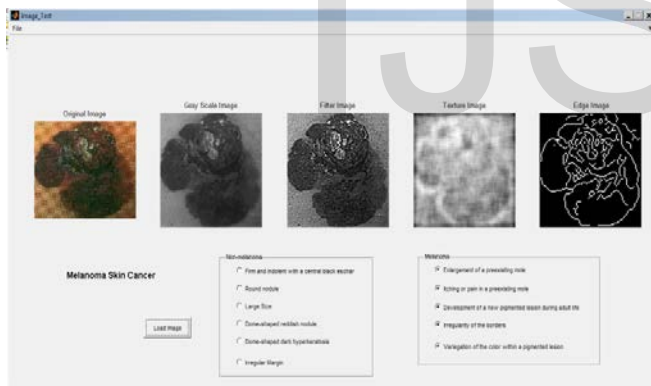


Fig.13. Melanoma Result of Tested Image

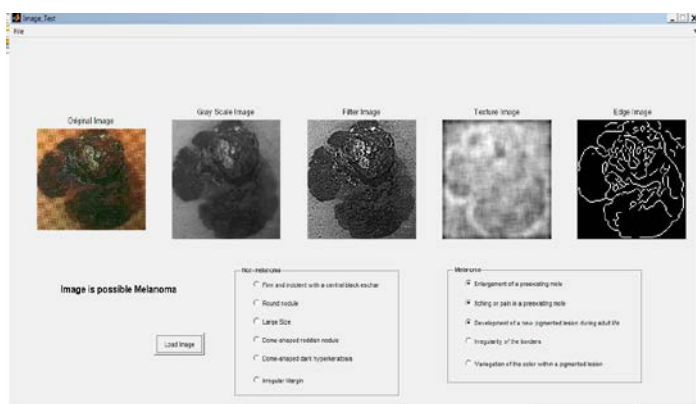


Fig.14. Possible Result of Melanoma

6 Conclusion

This research really tends to provide diagnosis support to physicians or radiologists by displaying relevant past case to classify into Non-melanoma or Melanoma of skin cancer images. Providing physicians with a set of pathologically-confirmed benign or malignant of skin cancer images which are of high similarity to a new difficult case, can help them to more confidently render a precise diagnostic decision and the CBIR system implemented regarding this concept performs as a powerful instructive tool for inexperienced physicians. The accuracy of test performance is fifty percentages. The system performance can be improved by combining the doctor's background knowledge.

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REFERENCES

- [08Sl] Slingsuff CL, Flaherty K, Rosenberg SA, Read PW. "Cutaneous melanoma"; (2008).
- [05Lea] Leachman SA, Lowstuter K, Wadge LM. "Genetic testing for melanoma", (2005).

- [04Mul] H Muller N Michoux, D Bandon, a Geissbuhler, "A Review of Content-Image retrieval Applications-Clinical Benefits And Future Directions", International Journal of Medical Informatics, 73, (2004).
- [03Yit] Yitzhaky, Y. and Peli, E., "A Method for Objective Edge Detection Evaluation and Detector Parameter Selection", IEEE Trans. PAMI, 25(8), pp. 1027-1033, (2003).
- [02Gri] Grigorescu, S. E., Petkov, N. and Kruizinga, P., "Comparison of Texture Features based on Gabor Filters", IEEE Trans. Image Process, pp. 1160-1167, 11(10), (2002).
- [00Sme] A.Smeulder, M. Worring, S.Santini, A.GuptaR. Jain "Content_Based Image Retrieval at the End of the Early Years",IEEE PAMI, vol.12,December , (2000).
- [98But] Butterworth, E., "14-An Open 4-Dimensional Biomedical Imaging System", (1998).
- [98Ste] Stephen T.C. Wong, "Medical Image Databases, Kluwer Academic Publisher", (1998).
- [96Gim] Gimmel'farb, G. L. and Jain, A. K., "On Retrieving Textured Images from an Image Database", Pattern Recog., 28(12), pp. 1807-1817, (1996).
- [88For] Marr, D. C. and Hildreth, E., "Theory of Edge Detection", Proc. R. Soc. Lond., B207, pp. 187-217, (1980).
- [88Har] Harris, C. and Stephens, M., "A Combined Corner and Edge Detector", Proc. 4th Alvey Vision Conference, pp. 147-151, (1988).

Power Point Tracker for PV Pannels using Switching Frequency Modulation",IEEE Transactions on Power Electronics,Volume 17,Issue 6,Nov.2002.