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Risk Analysis in Psoriasis skin disease with computer aided diagnostic system

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ABSTRACT

Computer-aided diagnosis (CAD) systems have been used for analysis of several skin diseases in the last few years. Psoriasis is a life-threatening skin disease affecting life of 125 million people worldwide. The paper presents a Computer-aided diagnosis (CAD) systems to aid the diagnosis of psoriasis along with its current practices, challenges and assessment techniques. The paper also gives a short review of the existing literature for all clinical parameters of Psoriasis feature extraction, feature selection, disease classification and overall CAD performance. Using a fixed data size of 540 images with equal number of healthy and diseased,10 fold cross-validation protocol, and SVM of polynomial kernel of type two, CAD system shows an accuracy of 63% with sensitivity and specificity of 68% and 58%.

INTRODUCTION

Dermatoscopy, also known as epiluminescence microscopy (ELM), is a non invasive skin imaging technique that can help dermatologists improve their diagnostic accuracy of pigmented skin lesions. However, effective use of dermatoscopy requires experience [1]. If a dermatologist does not have sufficient experience, dermatoscopy will actually reduce the diagnostic accuracy [2-3]. Many dermatologists therefore prefer to perform biopsies to diagnose suspicious lesions. However, biopsies are painful and unpleasant for patients. Therefore, interest has grown in computerised image analysis methods. Psoriasis is a chronic and auto immune disease with red and scaly plaques on skin [4]. Statistics show that psoriasis affects about 125 million people of the world population [5]. The influence of psoriasis differs depending on the geographical regions. The pre-valence of psoriasis in Europe, USA, Malaysia and India is about 0.6–6.5%[6], 3.15% [7], 3% [8] and1.02% [9], respectively. Psoriasisnot only affects the skin, but also the quality of life [9].

FEATURES EXTRACTION

Feature extraction and feature selection in psoriasis framework Feature extraction is one of the most vital components of computer-aided diagnosis (CAD) system For an optimal

classification, the most effective features in terms of degree of discrimination between the classes have to be selected. Figure 1 shows the color images of the diseased skin images and normal skin images. The features are extracted by applying mathematical operations on pixels of an image and thus reduce the original dataset. There are numerous feature extraction techniques available in literature which can be suited for dermatology images. We have used 4 color features and 4 grey scale features in our study which are 4 Texture fature: Energy, Entropy, Homogeneity, Contrast and 3 Color features red, green and blue component and one Redness feature.

(a)

(b)

Figure 1 (a) Diseased skin images (b) Normal skin images

FEATURE SELECTION

Feature selection, generally used in machine learning paradigm is another important step for

classification of a disease. It avoids the redundant and noisy features (less dominant features) and

thus reduces the dimensionality of the feature space which ultimately reduces the computational cost and improves the stability and classification accuracy [10].

CROSS VALIDATION

Classification is the final stage of CAD system. Brief discussions on several classifiers used in

dermatology diagnosis are presented in this section. The support vector machine (SVM) is a state of the art classification technique based on statistical learning theory [11]. Utilizing the training dataset, SVM provide a linear combination of a subset of data in the form of support vectors. These support vectors build the separating hyper plane which classify the input datasets. Different kernel functions such as linear, polynomial and radial basis can be used with varying degree. We also used SVM for cross validation technique.

RESULT

An in depth study of the risk classification of the skin disease is performed in this paper. We

proposed our CAD system for risk analysis of the Psoriasis skin disease classification and through various experiments performed over the skin images we obtained the mean accuracy of the system for 20 trails and K = 10 fold to be 63%. The accuracy is limited to the datasize that's why by increasing the data size the mean accuracy can be increased. Table shows the mean sensitivity and mean specificity of 68% and 58% respectively.

CONCLUSION

An automated CAD system is presented here for diagnosis of Psoriasis skin disease..Our objective was to present an in-depth analysis of psoriasis disease classification using support vector machine frame work in three different scenarios: (i)choosing color space and its features; (ii) choosing gray scale features derived from grayscale spaces and (iii) by combining the color and gray scale spaces.

Table 1 Result of the simulation

1	Mean accuracy	63%
2	Mean sensitivity	68%
3	Mean specificity	58%

REFERENCES

[1] Rigel DS, Russak J, Friedman R. The evolution of melanoma diagnosis: 25 years beyond the ABCDs. CA Cancer Journal Clin 2010; 60: 301–316.

[2] Abbas Q, Fondo´n I, Rashid M. Unsupervised skin lesions border detection via two-dimensional image analysis.

Comput Methods Programs Biomed 2011; 104: e1–e15.

[3] Celebi ME, Iyatomi H, Schaefer G, Stoecker WV. Lesion border detection in dermoscopy images. Comput Med Imaging Graph 2009; 33: 148–153.

[4] C. Leonardi, R.Matheson, C.Zachariae, G.Cameron, L.Li, E.Edson-Heredia, et al., Anti-inter leukin-17 monoclonal antibody ixekizumabin chronic plaque psoriasis, New England.Journal Medicine. 366 (13) (2012) 1190–1199.

[5] National Psoriasis Foundation, Statistics, Available at: http://www.psoriasis. org/research/science-of-psoriasis/statistics, 2015.

[6] V.Chandran, S. P. Raychaudhuri, Geoepidemiology and environmental factors of psoriasis, Journal of .Auto immun. 34 (3) (2010) J 314–J 321.

[7] Persatuan Dermatologi Malaysia, Overview of Psoriasis in Malaysia, Available at: http://www.dermatology.org.my, 2015

[8] S. Dogra ,S.Yadav, Psoriasis in India: prevallence and pattern, Indian Journ Dermatol. Venereol. Leprol.76 (6) (2010) 595.

[9] G. Krueger, J.Koo, M.Lebwohl, A.Menter, R.S.Stern, T.Rolstad, The impact of psoriasis on quality of life :results of a 1998 National Psoriasis Foundation patient-membership survey, Arch.Dermatol.137 (3) (2001) 280–284.

[10] S.V. Sree, E.Y.K.Ng, U.R.Acharya, Data mining approach to evaluating the use of skin surface electro-potentials for breast cancer detection, Technol. Cancer Res.Treat.9 (1) (2010) 95–105.

[11] V. Vapnik, Statistical Learning Theory, Wiley, New York, NY, 1998.

[12] D. Tembhurnikar, S. Jain, D. K. Chawriya, A. Shrivastava, Psoriasis Risk Classification: An Engineering Perspective Review. International Journal of Current Trends in Engineering & Research (IJCTER) e-ISSN 2455–1392 Volume 2 Issue 4, April 2016 pp. 631 - 635