Les deux premiers paragraphes annoncent le contexte, le troisième la problématique/motivation, le quatrième on pose le problème.

Introduction

Skin is the largest organ of the body and the most discriminative part of the recognition task of different human beings. Its inner characteristics of humidity determines the quality of the skin pores [1], and the skin chromophores constitutes the main element of interaction with light [2]–[4]. The melanin rate is used to make a barrier to avoid harmful exposure of electromagnetic radiations in the environment [5], and the oxy-hemoglobin which can be found in veins can inform suffocation or breath irregularities of the human being [6]. Moreover, the blood flow can be analyzed in order to determine the heartbeat of the body, among other uses [7]. ~~This organ~~ The skin has very specific properties studied in different fields as in cosmetics (how to make more efficient products that penetrate the skin/protect it [8]), computer graphics (in order to emulate realistic tissues [9]), and medicine to evaluate irregularities of the skin, and human health [10].

Optical Analysis of human skin is a non-invasive way to observe skin physiology, morphology and composition. ~~Continuous~~ For instance, white light ~~is~~ can be used to obtain a spectrum which is useful to analyze the skin and also all the quantitative variations related to skin components. Reflective properties ~~of the skin~~ are used to identify and recognize humans by presenting a part of their skins, as in biometrics, and to detect spatially distributed irregularities such as veins or abnormally vascularized regions, melanomas or malign tumors. In fact, different skin tissues have distinct or unique reflectance pattern which helps to differentiate different skin conditions [2], [11], [12]. Hence, the idea behind the diffuse reflectance is that light reflected from a target tissue ~~and it~~ provides ~~the~~ information ~~included~~ on the quantity of melanin pigment and its chemical structure, oxygenated and deoxygenated hemoglobin, carotene, and also the chemicals [13], [14]. This information, based on biochemical composition and the structure of the tissue, does not only indicate the presence and location of the pathology, but also indicates where the pathology has originated, also contributes to find the most appropriate treatment to cure the pathology by observing the characteristics of the tissue if it is needed [11], [12].

Those characteristics and the recent developments in analytical techniques of the skin, made us think about what kind of system should be envisaged to identify individuals in terms of biometrics. Thus, analyzing diffusion diagram of the skin, and the spectrum of skin diffusion by using certain wavelength is proposed.

In this paper, a system~~, consisting a sensor mounted on a rotating axe around a stepper motor in order to calculate a polar diffusion diagram of~~ extracting information from the skin ~~sample which is~~ based on its reflectance rate, is ~~presented~~ described. ~~Moreover, a spectrophotometer is used to gather the data of the tissue as a spectrum in visible wavelengths. Once, signal-to-noise ratio computation is performed, its data feed a processing system to characterize each sample and then, a cross-validated recognition task, achieving NC% accuracy and legitimizing the biometric application of this method, is executed.~~

In the first section different physical aspects of the interaction of light with skin are introduced. Then the measurement system is described and characterised. In the second section, samples, measurement protocol and results are presented. In the last section before conclusion, the obtained results are analysed and discussed in terms of efficiency for biometric applications.

Références de l'intro :

[1] J. K. Wagner, C. Jovel, H. L. Norton, E. J. Parra, and M. D. Shriver, "Comparing quantitative measures of erythema, pigmentation and skin response using reflectometry," *Pigment Cell Res.*, vol. 15, no. 5, pp. 379–384, Oct. 2002.

[2] N. Kollias and A. Baqer, "Spectroscopic characteristics of human melanin in vivo," *J. Invest. Dermatol.*, vol. 85, no. 1, pp. 38–42, Jul. 1985.

[3] K. S. Bersha, "Spectral imaging and analysis of human skin," University of Eastern Finland, 2010.

[4] M. Ferguson-Pell and S. Hagisawa, "An empirical technique to compensate for melanin when monitoring skin microcirculation using reflectance spectrophotometry," *Med. Eng. Phys.*, vol. 17, no. 2, pp. 104–110, Mar. 1995.

[5] J. J. Riesz, *The spectroscopic properties of melanin*. University of Queensland, 2007.

[6] I. V. Meglinsky and S. J. Matcher, "Modelling the sampling volume for skin blood oxygenation measurements," *ResearchGate*, vol. 39, no. 1, pp. 44–50, Feb. 2001.

[7] H. Gesche, D. Grosskurth, G. Küchler, and A. Patzak, "Continuous blood pressure measurement by using the pulse transit time: comparison to a cuff-based method," *Eur. J. Appl. Physiol.*, vol. 112, no. 1, pp. 309–315, Jan. 2012.

[8] E. Angelopoulou, "Understanding the color of human skin," 2001, vol. 4299, pp. 243–251.

[9] I. V. Meglinski and S. J. Matcher, "Computer simulation of the skin reflectance spectra," *ResearchGate*, vol. 70, no. 2, pp. 179–86, Mar. 2003.

[10] A. Garcia-Uribe, J. Zou, M. Duvic, J. H. Cho-Vega, V. G. Prieto, and L. V. Wang, "In vivo diagnosis of melanoma and non-melanoma skin cancer using oblique incidence diffuse reflectance spectrometry," *Cancer Res.*, vol. 72, no. 11, pp. 2738–2745, Jun. 2012.

[11] R. R. Anderson and J. A. Parrish, "The Optics of Human Skin," *J. Invest. Dermatol.*, vol. 77, no. 1, pp. 13–19, Jul. 1981.

[12] J. Y. Qu, H. Chang, and S. Xiong, "Fluorescence spectral imaging for characterization of tissue based on multivariate statistical analysis," *JOSA A*, vol. 19, no. 9, pp. 1823–1831, Sep. 2002.