

Information and Communication Technologies for Wound Diagnosis and E-Learning

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Abstract

Precise diagnosis of pressure ulcers is critical in order to proceed with the right diagnosis and appropriate treatment. This crucial evaluation is carried out by clinicians using standardized scales based mainly on the visual inspection of the wounds. More accurate wound evaluation and monitoring could be achieved by registering the precise identification and measurement of all tissue types present in the wound-bed or in its surrounding areas. Nevertheless, visual inspection constitutes a very subjective and inaccurate way to deal with tissue recognition and assessment. Pressure ulcers mostly have irregular shapes, vague boundaries and very heterogeneous colourations. These conditions make precise automatic image segmentation and tissue detection a non-trivial computational task, where traditional image processing techniques usually fail. We propose a complex approach that uses neural networks and Bayesian classifiers to get a computer-aided decision support system for wound diagnosis. This system is based on a cascade of single-class classifiers for effective pressure ulcer tissue recognition. On the other hand, the education on pressure ulcers is mainly based on traditional lecturing, seminars and face-to-face instruction, sometimes with the support of photographs of wounds being used as teaching material. This traditional educational methodology suffers from some important limitations, which could affect the efficacy of the learning process. By using our computer-aided diagnosis tool as a central core for image segmentation and automatic tissue recognition, a web-based learning system named *ePulab* has been designed and developed as an adaptive e-learning tool for the autonomous acquisition of knowledge on wound evaluation. This innovative software has been validated by comparing its learning efficacy with that from a traditional face-to-face instruction.

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