



TELEDERMATOLOGY

DEVELOPMENT AND ACCURACY OF AN ARTIFICIAL INTELLIGENCE FOR ACNE EVALUATION

Sophie Seité⁽¹⁾ - Dominique Moyal⁽¹⁾ - Khaoula Abidi⁽¹⁾ - Guénaelle Le Dantec⁽¹⁾ - Amir Khammari⁽²⁾ - Michael Benzaquen⁽³⁾ - Brigitte Dreno⁽⁴⁾

La Roche-posay Dermatological Laboratories, ., Levallois-perret, France⁽¹⁾ - Nantes University Hospital, Department Of Dermatology, Nantes, France⁽²⁾ - Hôpital Nord Assistance Publique - Hôpitaux De Marseille, Department Of Dermatology, Marseille, France⁽³⁾ - Nantes University Hospital, Department Of Dermatology, Nantes, France⁽⁴⁾

Introduction: Smartphone applications have been proposed as diagnostic self-monitoring tools. Acne is a very common dermatological disease affecting mainly adolescents but access to dermatologists is sometimes difficult.

Objective: We developed an artificial intelligence algorithm for acne severity assessment (GEA) and acne lesions identification which was evaluated compared to clinical diagnosis by trained dermatologists.

Methods: The development of the algorithm was done in five steps.

Step 1 - Get data: Collection of 6138 acneic patient images (face, right and left profiles) using smartphones

Step 2 -Clean, prepare and manipulate data: Three trained dermatologists assessed GEA for each patient on images. Intra- and inter-dermatologist reproducibility were checked. For each patient, GEA given by the majority was used to train the algorithm.

Lesion identification (retentional, inflammatory, pigmented) was performed by a dermatologist on photos using a tagging tool and these photos were used to train the algorithm.

Step 3 - Train model: Algorithm learned and adjusted its accuracy for GEA and lesions identification on a set of photos. Results were submitted to dermatologist for correction.

Step 4 -Test data: A clinical study was performed on 53 acneic patients in order to compare GEA grading and lesion identification performed by 3 dermatologists in face to face, on images and by the algorithm

Step 5 - Improvement of the algorithm: based on the results obtained in step 4, new versions of algorithms were proposed and tested

Results: After the last improvement, accuracy of GEA and precision, recall and F1 score for the 3 types of lesions were evaluated. 89% of accuracy was obtained for GEA and F1





scores were 84% for inflammatory lesions, 72% for pigmented lesions and 61% for retentional lesions.

Conclusion: Artificial intelligence algorithm is a promising tool for pre-evaluation of acne severity and lesion identification.

