“Thermal Image Based Classification of Patch Test Reactions”

Abstract:

New possibilities of solving medical problems have been brought into the horizon by the non-stop developing Machine Learning (ML). In this thesis, an iOS application embedded with a convolutional neural network (CNN)-based regression model is introduced as a noninvasive patch testing reactions classification tool.

In dermatology, patch testing of contact allergens to diagnose allergic contact dermatitis (ACD) is a traditional, useful method. The most important decision is the distinction between allergic and irritant reactions. A recent research suggested that the two groups hold rather significant differences in terms of increased temperature compared to surrounding skin.

The application makes use of an external thermal camera, which can render both real and thermal images. Real images are first rendered and presented in the application user interface in order for the dermatologists to better target the interested area. Thermal images will be run through the embedded CNN-based regression model and the increased temperature will be the output. The decisions are then made based on the temperature characteristics. This application is planed to be a convenient assistant tool for the dermatologists.

Because only the temperature difference is needed for the decision making, the model was trained on random thermal images, in stead of real patch testing reactions images. This avoided the forever existing insufficiency and imbalance problems of medical training data. Further more, the trained model is highly generalized, which makes it possible to be applied in other temperature related research situations.

Zeit: Friday, 27.09.19, 15.30 hst
Ort: Geb. 52, 01-33