

**Doctoral School of Information and Biomedical Technologies
Polish Academy of Sciences (TIB PAN)**

SUBJECT:

Automatic calculation of wound surface area using artificial intelligence (AI) methods and convolutional neural networks (CNN)

SUPERVISOR:

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DESCRIPTION:

The rate of wound surface area reduction during treatment is an important predictor of the success of the therapeutic process [1]. If this reduction is larger than 40% within 4 weeks, the wound closure within 12 weeks is more probable than in the case when this change was smaller [2]. Wound surface area monitoring in 4-week period is usually performed when the patient is ambulatory treated and measurements are taken at follow-up visits or the wound area is determined based on photos of the wound sent by patients from their homes. Now, the analysis of such images and the wound edges tracing is performed manually by the operator taking the wound surface area measurement. If the number of necessary measurements per operator is large, he may be overloaded and may take measurements with a delay of up to 3 days (weekend), which may delay therapeutic decisions and reduce the quality of patient care. Therefore a system that works automatically 24 hours a day would be much more useful.

The person developing such a system should use elements of artificial intelligence (AI) and convolutional neural networks (CNN) [3] to analyze photos taken, for example, with a smartphone and sent by the patient to a safe location in the file cloud. The developed system would need to find calibration markers and wound edges in the photo, calculate the wound surface area, and then send the measurement result to the database and directly to authorized recipients.

BIBLIOGRAPHY:

1. Lavery LA, Barnes SA, Keith MS, Seaman JW, Armstrong DG. Prediction of healing for postoperative diabetic foot wounds based on early wound area progression. *Diabetes Care*. 2008; 31:26-29.
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3. Ohura N, Mitsuno R, Sakisaka M, Terabe Y, Morishige Y, Uchiyama A, Okoshi T, Shinji I, Takushima A. Convolutional neural networks for wound detection: the role of artificial intelligence in wound care. *J Wound Care*. 2019 Oct 1;28(Sup10):S13-S24.