Melanoma skin cancer detection using deep transfer learning with channel attention

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ABSTRACT

Melanoma is a dangerous type of skin cancer. Even though it occurs about one percentage of the population, its death rate is higher than other skin cancers. Melanoma has the potential to spread to other parts of the body very rapidly. However, if it is detected at its earlier stage, the chance of survival is very high. Physical experiments can be inaccurate even if done by the expert dermatologist as it is a challenging visual task due to the difficulties of differentiating melanoma from other skin cancers and normal moles. Automated computer-based technology is essential to detect melanoma to assist the dermatologist and reduce the time and cost. Although several previous approaches have been proposed, their detection accuracy is considerably low, and the detection time is relatively high. This study has proposed a deep transfer learning-based melanoma detection approach to detect cancer using clinical and dermoscopic images. We have utilized the EfficientNet architecture, which was trained on the ImageNet dataset. The pre-trained EfficientNet architecture is fine-tuned with melanoma and non-melanoma images. In addition, a channel-attention module is included in the architecture to feed the melanoma-specific features to the pre-trained model. Our proposed approach is evaluated on the University Medical Center Groningen (UMCG) dataset and HAM10000 dataset, containing 170 clinical images and 10015 dermoscopy images, respectively. Experimental evaluation demonstrates that the proposed approach outperforms state-of-the-art approaches as it achieves 84.1% and 96.3% accuracy in UMCG and HAM10000 datasets, respectively.

Keywords: Clinical images, Dermoscopy images, EfficientNet, Melanoma detection.