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*8th
meeting on
medicinal
biotechnology*

BOOK OF
ABSTRACTS

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BOOK OF ABSTRACTS OF THE 8TH MEETING ON MEDICINAL BIOTECHNOLOGY

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Optimizing Melanoma Screening: AI-Based Risk Stratification for Efficient Patient Prioritization

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Background & Aim: Melanoma is a malignant neoplasm derived from melanocytes that is highly curable when detected early. However the 5-year survival rate drops from 99% to 35% when diagnosed at advanced stages [1,2]. In Portugal, constraints in the public health care system (SNS) waiting lists may compromise this critical treatment window [3]. This work presents the development of an artificial intelligence (AI)-powered clinical decision support system designed to assist dermatologists by pre-classifying melanoma risk in dermoscopic images obtained in primary healthcare settings, while optimizing patient prioritization. **Methods:** The proposed image-classification methodology employs a two-stage deep-learning computer vision pipeline implemented in Python using TensorFlow and trained on the publicly available ISIC 2020 and HAM10000 skin-lesion datasets. First, skin lesions are identified, isolated, and segmented using a U-Net architecture. Subsequently, the segmented lesion masks are classified using an EfficientNet-based model to estimate malignancy probability. The trained models were integrated into a real-time

web application developed using the Reflex framework. **Results:** Preliminary results demonstrate that the U-Net architecture effectively segments lesions, reducing the influence of irrelevant artifacts during classification. Following segmentation, the EfficientNet classifier achieved an accuracy of 98.67% and an area under the receiver operating characteristic curve (AUC) of 99.8% on a test set comprising 4,500 dermoscopic images. Importantly for clinical screening applications, the model achieved a sensitivity (recall) of 0.99 for malignant lesions, corresponding to only 17 false negatives among 2,250 malignant cases. **Conclusions:** The proposed two-stage deep-learning pipeline shows potential as a clinical support tool for dermatologists. By providing automated and interpretable AI-based risk assessments, the system may assist physicians in prioritizing urgent cases with greater confidence. As a proof-of-concept, this tool has the potential to augment clinical workflows and help reduce diagnostic delays, particularly within the public healthcare system.

KEYWORDS: melanoma, deep learning, dermatology, triage

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