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Automatic and Interpretable Diagnosis of Skin Cancer

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ABSTRACT

Image processing and machine learning methods profoundly changed the way medical images are analyzed and diagnosed. These two fields have been combined over the years to develop computer-aided diagnosis systems (CADS) to help physicians. While the main limitation of past methods was their suboptimal performance, which could not rival clinical experts, nowadays the main problem is the lack of self-explainability and interpretation of deep approaches. In this presentation I will give an overview of my research path towards improving the interpretability of CADS for the diagnosis of skin cancer. This is a thriving field of research, with several challenges, such as: i) finding an appropriate representation for the data; ii) ensuring CADS are robust to different acquisition setups; and iii) dealing with highly unbalanced and weakly annotated datasets. I will describe the work I have done to address these challenges, using clinically inspired and self-explainable systems. I will conclude that self-explainable systems are able to achieve performance levels comparable to state-of-the-art decision systems.

SHORT BIO

Catarina Barata received B.Sc. and M.Sc. degrees in Biomedical Engineering, and Ph.D. degree in Electrical and Computer Engineering from Instituto Superior Técnico, University of Lisbon, in 2009, 2011, and 2017 respectively. From 2017 to 2018 she has been a post-doctoral researcher, and research assistant since 2019 at the Institute for Systems and Robotics (ISR), where she works on machine learning based methods for interpretable analysis of skin cancer and surveillance data. She collaborates with the International Skin Imaging Collaboration (ISIC) and was invited speaker at IEEE CVPR workshop. Her interests include medical imaging, image analysis, pattern recognition, and machine learning, in particular probabilistic and deep learning methods.