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A Python based imaging algorithm to identify necrotic zone for Erythematous Skin Lesions

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Ruxolitinib which is a JAK-2 inhibitor is an approved drug used for the treatment of myeloproliferative fibrosis. It is seen that usage of this drug is not without effects. It is normally accompanied by exudates on the lips or ulcers. In severe cases the prolonged use of this drug can lead to necrolysis of the epidermis. Most of the reactions are accompanied by a darker necrotic portion. Doctors often need to find the necrotic portion of a major erythematous lesion to assess the extent of damage. In the case of multiple such lesions it is often very time consuming to note the extent of damage for each lesion. Most detection algorithms are system and processor heavy when it comes to image detection programs as they require a much powerful system i.e. CT images, MRI systems etc. in which the analysis is to be done. So, a python-based script has been designed which would run in most systems and can be ported to other platforms i.e. UNIX or WINDOWS. The purpose of this algorithm is to specifically identify and automatically highlight the necrotic portion of such lesions in one pass. The colour and nature of such lesions is determined by analysing the individual pixel values around the necrotic portion. The algorithm is designed based on the open cv 2.4.13 framework of python. Supporting packages of NumPy and Pandas which are numerical packages typically used for complex mathematical calculations has been used. NumPy has been used to generate the contour points concerning the darker potion of the lesion. The Jupyter compiler has been used to carry out the analysis. For this algorithm to work an image of the lesion has been taken and converted to grayscale and post thresholding by OTSU's method contours are approximated depending on the threshold generated. Contours are the surface profile is roughly visualized by making use of the canny edge detection algorithm which is pre-loaded on to the open cv framework. Contours identify a specific or entire boundary of the object to be separated. After the contours are generated the best possible set of points which represent the idle location of the necrotic tissue are taken and is drawn over the image. The contours can be either drawn directly or approximated over the image. From the observation it is seen the later yields near-perfect identification of the necrotic portions of the lesion. This could be implemented along with other imaging modalities for better identification. Future applications of this could include the use of artificial neural networks for faster detection time.

Speaker Biography

Satyake Bakshi has completed his Bachelor of Technology from Vellore Institute of Technology, India at the age of 22. He is currently pursuing his master's degree at Carleton University, Canada. His area of interest is in rehabilitation engineering and medical image processing.

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