

(Figure 1). The results of preclinical evaluations were showed in Figures 1(A,B).

Conclusions: The suitable permeable cPVA foam was successfully prepared and employed to enhance and promote wound healing in wounds, even in diabetic foot ulcer wound and good clinic results were observed. Also, low residual FA content, good cell and tissue anti-adhesion, high permeable property could be obtained for biological and preclinical evaluations of CRTDS because the specific microenvironments and architectures with fully open-cell and open-channel microstructures in the cPVA foam.

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364 | An energy functional model by gradient vector-driven active contour for local fitted image segmentation

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Objective: To design a gradient vector-driven active contour local fitted image segmentation model based on information entropy for analyzing the construction of the active contour model by the variational and level set methods for validating the proposed model theoretically and simulation experiments.

Methods: Firstly, several important active contour models based on image boundary features are introduced, and the existing problems are analyzed in depth, and the causes of the problems are pointed out. Next, the non-conservative behavior of the gradient vector flow field is studied in depth, and an important conclusion about the flow field divergence of the gradient vector is obtained in the local fitted image segmentation model. On this basis, a new energy functional is constructed to measure the flux of the gradient vector flow field through the active curve, and transform the image segmentation problem into the minimum value of the energy functional. Finally, a new active contour model is constructed using the gradient flow of the above energy functional.

Results: To demonstrate the performance of the development model, the method applies it to segmenting the composite image and the real image in a variational level set framework.

The demonstration shows the segmentation result when the development model is applied to four clinical medical images having uniformity and complex image background intensity. As shown in these examples, the proposed model can accurately identify the boundaries of all target objects based on a randomly selected rectangular initial curve while successfully eliminating a large amount of undesired background information due to the presence of two different local information. Fitting images can effectively highlight ideal objects with different texture features and significantly reduce the adverse effects of complex image backgrounds in image segmentation. By locally fitting the image, the approximate local region exhibits a unique intensity in emphasizing the intensity difference between the foreground and the background of the image to be segmented, which can be partially verified.

Conclusion: These segmentation results can effectively demonstrate their performance in dealing with severe intensity inhomogeneities, extracting multiple target objects, and eliminating complex image backgrounds. In particular, CV and CEM models cannot handle intensity inhomogeneities and have the worst segmentation performance in these models; and the LBF, LIF, LGDF, and LRCV models can be somewhat from severe intensity inhomogeneities. Those regions are extracted from the desired object, but there are insufficient or excessive segmentation problems in the neighborhood near the target boundary. Unlike these models, the proposed model achieves better segmentation performance in terms of the accuracy of all four images based on the same initial contour curve.

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365 | Facial expression recognition of pain detection using recurrent neural networks

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Objectives: Facial expression is one of the most important factors in human emotional judgment. Ekman and Friesen studied six basic human expressions, these are happiness, sadness, surprise, fear, anger, disgust, and systematically created an image library of facial expression, detailing the face changes, including eyebrows, eyes, eyelids, lips, etc., corresponding to each expression. Expression recognition has made great progress in medical field, especially pain expression recognition judgment. Prkachin and Solomon proposed that the relationship between pain and the motor unit of the face: eyebrow gathering, eye closed, levator muscle