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Multiple Surfaces Reconstruction from 2D sections Using an Increasing 2D Vector Flow

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Abstract : This paper presents a new approach to automatically construct multiple surfaces from set of 2D sections . A convex curve and centripetal normal force are employed to split each sections to a set of shells . Each shell contains a single image region and defines an initial counter evolved by the geometric heat differential equation in the direction of the centripetal force toward the outer boundary of the image region. Then a reparameterization is performed to increase the flow and make each counter converging into concavities. Thus, the 2D sections are segmented to a set of contours, divided to subsets of similar contours . Each subset is used to construct the surface of a single 3D object linking corresponding vertices . To validate the theory a set of experiments is performed using synthetic and medical 2D sections A discussion and comparison of the method with set of existing is given at the end of the paper .