Vessel centerline extraction using new center of gravity equations

ABSTRACT

The extraction and tracking of the vessels and their centerlines of coronary artery vessels in 2D and 3D angiograms has been vital part of many clinical analysis studies. This paper presents a new approach to extract the centerlines of vessels using novel center of gravity equations. The new equations depend on the intensity value as their main factor to track the vessels and by applying the center of gravity technique it can lead to centerline extraction. The new algorithm is called New Center of Gravity (NCOG). NCOG algorithm consists of four stages. First stage is angiogram partitioning using Recursive data structure technique. The second stage is to calculate the gray pixels in each partition and compare them with a threshold value (T). The third stage is center of gravity (COG) calculation. The fourth and last stage is connecting the final COG points by lines. The algorithm using the new COG equations were applied on a raw of clinical data and the results showed high robustness in extract the centerlines of vessels. We can conclude that our approach is robust, time saving, and helpful tool in surgery management and scientific researches.