Introduction: Disturbed flow conditions at the bifurcation of common carotid artery (CCA) plays an important role in the development of local atherosclerotic plaques, which may lead to stroke occurrence. As 3D models, built based on ultrasound imaging, can improve diagnostic assessment and support revascularization interventions, our aim was to develop a carotid segmentation algorithm that can detect CCA bifurcation contours used to build such 3D models. Methods: The algorithm is based on the hypoechoic characteristics of the lumen and the echogenic characteristics of the carotid bifurcation wall for the identification of their boundaries. Firstly, an ultrasound image in B-mode is obtained from a carotid bifurcation. Then the sonographer defines two initial contours in the image, one corresponding to the lumen and another to the bifurcation wall, for posterior application of the Chan-Vese level set model. This method provides the automatic segmentation of the arterial lumen and bifurcation boundaries of the carotid artery in longitudinal ultrasound images. The main advantage of our method relies on the identification of the carotid lumen based on its hypoechoic characteristics, overcoming the limitations of the usual methods with human intervention. Finally, a comparison is done between the contours obtained manually and automatically. Results: The results obtained, with a mean value of area overlapped equal to 96.78%, and a maximum distance between the non-coincident points of the contours automatically and manually defined, of 9.85 pixels, confirm the good quality of our method. Regarding the distances between the non-coincident points of automatically and manually obtained contours, the overall error is very low (maximum value equal to 1.42 pixels), proving that the contours resultant by the automatic segmentation are similar to the ones manually defined by the expert. Conclusion: Our method of segmentation has proven to be highly efficient, allowing an accurate computer simulation image of carotid bifurcation.