We are investigating the accuracy with which a unique, semi-automatic segmentation process can outline the prostate on transabdominal ultrasound images. We anticipate that the fully developed method will increase the efficiency and reproducibility of radiation treatment planning and delivery, and may prove critical in achieving the threshold in efficiency necessary for routine incorporation of dynamic imaging. This paper presents a first step toward full automation involving a new active contour model for semi-automatically outlining the prostate from ultrasound images. The approach utilizes a polar active contour model, speckle reducing anisotropic diffusion, and the instantaneous coefficient of variation edge detector. First, a new curve evolution equation in polar coordinates is derived by minimizing an energy functional. Then, the instantaneous coefficient of variation edge detector is introduced to attract the contour toward prostate boundaries. A curve initialization technique is described that requires a simple user intervention, an elliptical curve fitting and a binary flow contour regularization. The proposed method was tested on 27 quasi-axial transabdominal images from six patients. The performance of the method was quantitatively evaluated by comparison to manual outlines drawn by multiple expert observers. The average distance between the semi-automatic segmentation and the mean of manually outlined boundaries was found to be less than 1 mm, and the boundary location accuracy exceeded 75% (1σ).