Accurate and automatic segmentation techniques that do not require any explicit prior model have been of high interest in the medical community. We propose a fully-automatic method for segmenting the femur from 3D Computed Tomography scans, based on the graph-cut segmentation framework and the bone boundary enhancement filter analyzing second-order local structures. The presented algorithm is evaluated in large-scale experiments, conducted on 197 CT volumes, and compared to other three automatic bone segmentation methods. Out of the four tested approaches, the proposed algorithm achieved most accurate results and segmented the femur correctly in 81% of the cases.