This paper proposes a novel approach for dicrotic peak and notch detection from blood volume pulse (BVP) signals obtained through a photoplethysmography sensor. Dicrotic notch and peak represent the closure of the aortic valve and subsequent retrograde flow. These characteristics provide important information about the cardiovascular system. The proposed method finds points with the most significant slope changes in the BVP waveform. This is achieved by comparing the fit of broken-stick and straight-line models in a sliding time window. Weighted broken-stick models with different scales and shapes are used in sequence to detect the following four features in the BVP waveform: the onset, systolic peak, dicrotic notch, and dicrotic peak. The proposed method is robust because it overcomes the poor periphery perfusion and motion artifacts in the signals even if the dicrotic notch and peak are not strongly identifiable.