

ABSTRACT

This study develops an Electrocardiogram (ECG) signal processing system based on Field Programmable Gate Array (FPGA) by employing Hjorth Parameters as a feature extraction method and the K-Nearest Neighbor (KNN) algorithm as a classification method. The ECG dataset from MATLAB was converted into 16-bit signed format and processed using VHDL, with MATLAB results serving as a validation reference. The implementation of Hjorth Parameters in VHDL demonstrated consistent computational patterns compared to MATLAB, although scale differences were observed due to multiplication factors in each parameter. Furthermore, the Hjorth Parameters results were utilized as input for the KNN algorithm in MATLAB, yielding a classification accuracy of 41.1%. These findings indicate that the combination of Hjorth Parameters and KNN has potential in distinguishing ECG signal classes, although further improvements are required to enhance accuracy. Therefore, this study provides an important foundation for the development of a more accurate FPGA-based ECG classification system that can be extended to real hardware implementation in future research.

Keywords: ECG, FPGA, Hjorth Parameters, K-Nearest Neighbor, VHDL, Modelsim