

基于对数运算的 Sigmoid 函数的研究与实现

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摘 要: 基于对数运算的 sigmoid 函数常被用作神经网络的阈值函数, 将变量映射到(0,1) 之间. 为了研究其高速率, 高精度, 低功耗的性能, 以对数运算为实现原理, 对 sigmoid 函数做了研究并继而实现其函数, 通过 SystemVerilog 仿真平台对设计进行简单验证. 通过比较仿真平台产生的输出与设计产生的输出来总结本次设计的 sigmoid 函数的速率, 精度, 功耗等性能指标. 结果表明: 本次设计的 sigmoid 函数在速率上得到了改善, 进行一次函数运算需七个时钟周期(主频 200 MHz) 在精度上也稍有提升, 降低了硬件功耗.

关键词: 对数运算; sigmoid 函数; 精度; 速率; 功耗

Research and Implementation Based on Transcendental Function Coprocessor Sigmoid Function

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Abstract: Sigmoid function based on the logarithm operation is often used as the threshold function of neural network mapping variables between zero and one. In order to study its high speed, high precision, low power consumption, by logarithm operation for the realization of the principle, we do the research and then realize its function for the sigmoid function. We also do simple design verification through the SystemVerilog simulation platform, and summarize performance indicators of the sigmoid function on rate, precision, power consumption and so on by comparing the output of the simulation platform with the output of design. Results show that the designs of the sigmoid function on rate are improved, a functional operation needing seven clock cycles (frequency 200 MHz), a slight increase on the precision. Hardware power consumption has been reduced.

Key words: transcendental function; sigmoid function; precision; rate; power consumption

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