A Novel Way to Design and Implement Statistical Operations based on FPGA

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Abstract

The architecture design for statistical operations to compute the Mean, Variance, Standard Deviation, RMS (Root Mean Square), Covariance, and MSE (Mean Square Error) values has been implemented on hardware concerning Xilinx Spartan 3E XC3S500E FPGA and worked properly up to maximum frequency of 73.252 MHz. The practical outcomes have been compared with the theoretical values calculated by Matlab with maximum error of 1.425%. New methods of design were concerned for the architecture of each function to reduce the number of slices.

References

2. Sallee, Philip Andrew, 2004 Statistical methods for image and signal processing, PhD diss., UNIVERSITY OF CALIFORNIA DAVIS.
Monte-Carlo simulations. In ICECE Technology, International Conference on, pp. 89-96. IEEE.


5. T. O. Bachir and J. P. David. 2010 performing floating-point accumulation on a modern FPGA in single and double precision. Field-Programmable Custom Computing Machines (FCCM), 18th IEEE Annual International Symposium on. IEEE.


9. D. Bishop, 1076-2008 Fixed point package user’s guide. Packages and bodies for the IEEE.

**Index Terms**

Computer Science  
Signal Processing

**Keywords**

FPGA, VHDL, Statistical Operations, Accumulators, fixed point.