Universidade Católica de Pelotas

Prediction Algorithm For Selecting Approximation Level In Approximate Architectures for Calculating the SATD 4x4

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Summary

- Introduction
- Background
- Related Works
- Methodology
- Conclusions.

Introduction

- Most devices that handle digital videos are battery operated.
- At the same time, recent and emerging mobile applications require high performance at low energy consumption.
- Developing hardware accelerators for HEVC it is very important to reduce power dissipation.

Introduction

- Approximate computing emerged as promising paradigm.
- High Efficiency Video Coding (HEVC) is the most efficient standard in term of compression compared with the previous standard H264/AVC.
  - Able to encode a video with the half number of bits.
- Video coding is considered an error-tolerant application because it applies lossy compression algorithms that exploit the limitations of the human visual system.

Background

- Sum of Absolute Transformed Differences (SATD).
- Similarity metric used to compare two pixel blocks (Original and Reference).

$$SATD = \sum_{i,j} |HT_{(i,j)}|$$

$$HT = H \cdot W \cdot H^T$$

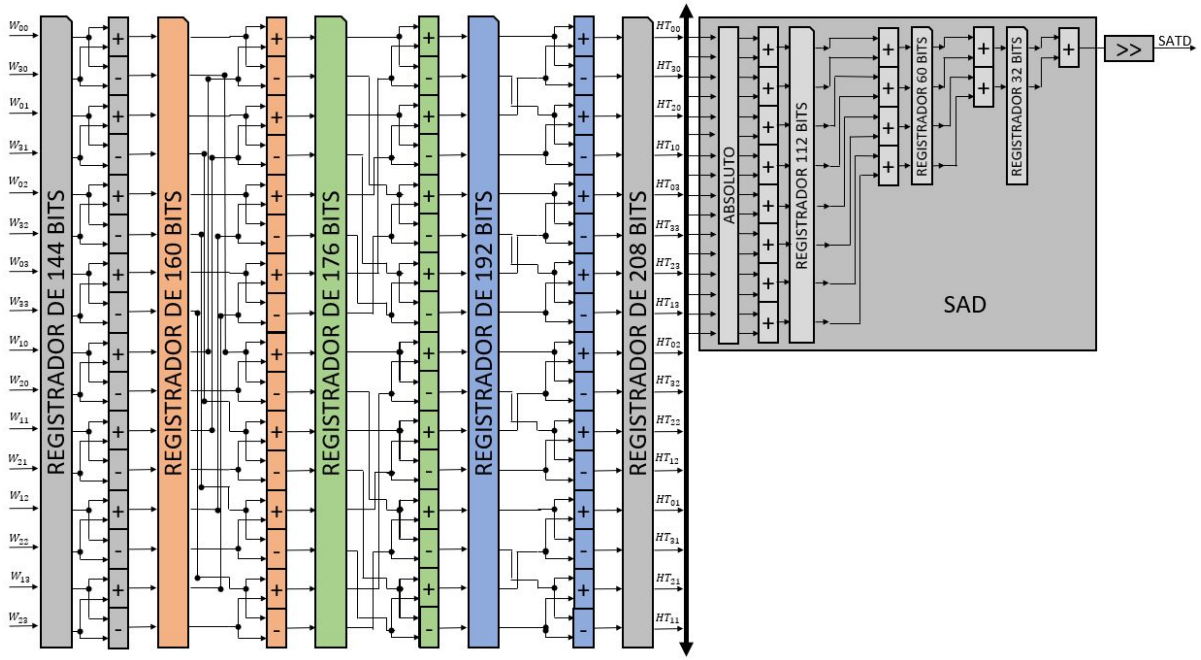
$$W_{i,j} = O_{i,j} - R_{i,j}$$

$$H = \frac{1}{2}\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 \\ 1 & 1 & -1 & -1 \\ 1 & -1 & -1 & 1 \end{bmatrix}$$

HT- Hadamard Transformed of W, the residual block.

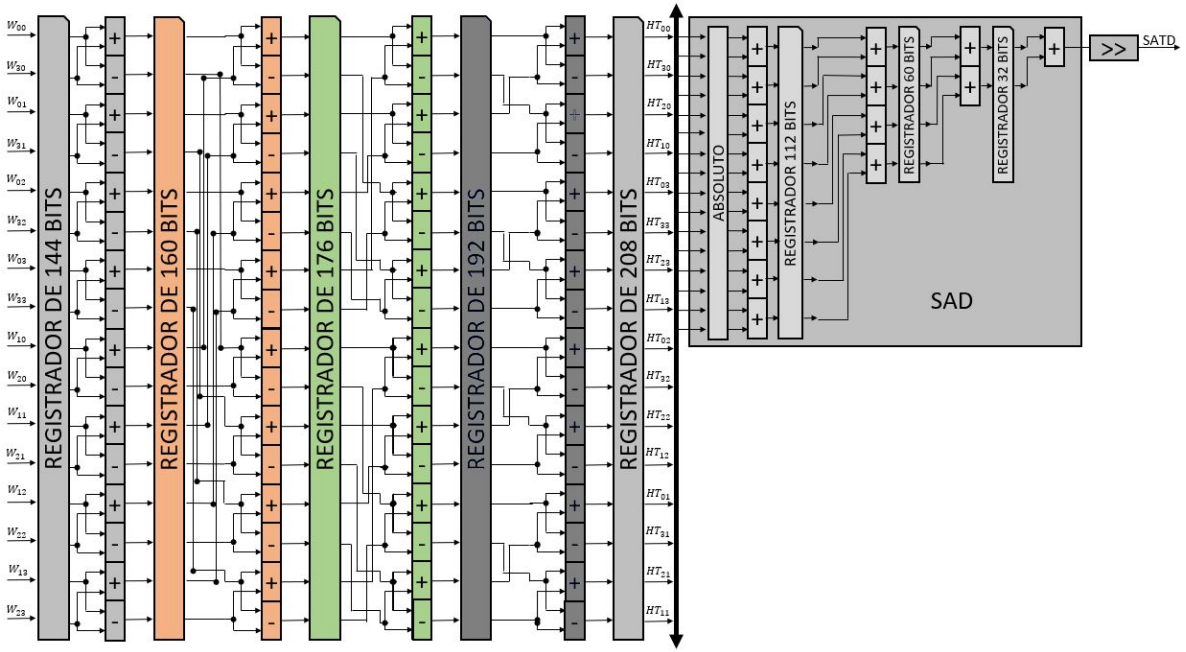
W - The difference between the Original (O) and Reference (R) blocks.

Methodology



➢ Example of Precise SATD 8x8 architecture.

Methodology



➢ The Register of 192 Bits has been excluded from our precise architecture.

Conclusions

- We are based on an architecture with multiple levels of approximation for calculating SATD 4x4.
- This work will propose the implementation of a prediction algorithm.
- This algorithm will be used to choose the best level of approximation of the architecture in each moment of the codification.
- Expected obtain the bests results of quality and efficiency in compression and energy.

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Thank You Very Much !!

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