Reduced neighboring dependency in context selection of significant_coeff_flag for parallel processing (JCTVC-E330/m19858)

Vivienne Sze, Madhukar Budagavi
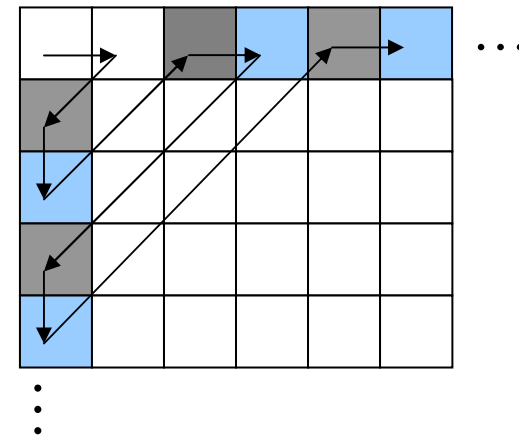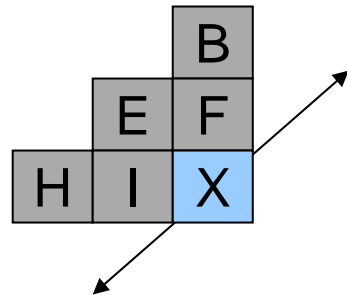
Texas Instruments Inc.

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Motivation

- Increase throughput of CABAC while maintaining high coding efficiency

- For parallel multi-bin decoding, minimized dependency across bins
  - Dependencies require speculative computations

- For transforms larger than 8x8
  - use zig-zag scan
  - context selection depends on neighbors

JCTVC-D260 (adopted in HM-2.0) – eliminated diagonal dependencies; context selection of X (blue), depends on neighboring values (grey)
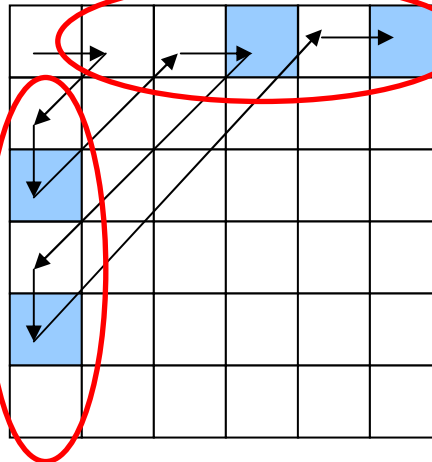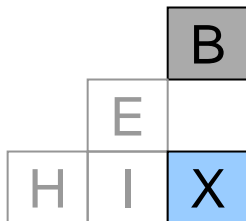
Process blue and grey in parallel at edges; remove dependency on most recently processed neighbor
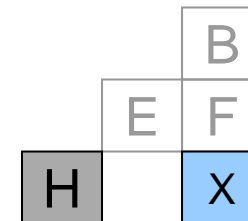
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Reduce Dependency

- Remove dependency on immediate top or left neighbor when processing first column or row of transform, respectively
    - Reduces speculative computations in context selection for parallel bin processing

First column: Context selection not dependent on F. Note: H, E, and I do not exist for these positions.

First row: Context selection not dependent on I. Note: B, E, and F do not exist for these positions.

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Experiment Results

- HM-2.0 under common conditions

- Simulation platform is LSF equipped with Intel(R) Xeon(R) CPU X5570@2.93GHz 64 bits Linux machines

- Results cross-checked by Sony (JCTVC-E382)

Coding efficiency impact

Intra	Random Access	Low Delay
0.1	0.1	0.1

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Conclusions

- Reduce context dependency at edges of transform to reduce speculative computations for parallel processing

- Coding efficiency impact of only 0.1%

- Recommend for adoption into HEVC test model
  - Draft text available in contribution

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