### Background

- H.264/MPEG-4 AVC is the latest international video coding standard, with very good performance and enormous computations.

- Adaptively transformation tool was added to enhance for the growth of HDTV market demand by JVT currently, which consumes more computations.

- Reducing the complexity of an 8x8 integer transform and quantization has became an urgent problem.

- Our research introduce all zero block algorithm to solve these problem.

### Research approach

#### Proposals

- SAD value based early termination algorithm for 8x8 integer DCT and quantization
- SATD value based early termination algorithm for 8x8 integer DCT and quantization

#### Computational Saving

- SAD and SATD relation derivation

\[
\text{TH}_{\text{satd}}(QP) = 0.033 \times QP^3 - 2.16 \times QP^2 + 51.8 \times QP - 407
\]

\[
\text{TH}_{\text{sad}}(QP) = 0.026 \times QP^3 - 1.56 \times QP^2 + 33.3 \times QP - 230
\]

\[
\text{TH}_{\text{satd}}(QP) = 0.013 \times QP^3 - 0.603 \times QP^2 + 16.3 \times QP - 170
\]

Therefore, if \( SAD \leq \text{TH}(QP) \) it is an AZB.

\[
\text{SAD} = \frac{1}{2} \sum_{i=0}^{7} \sum_{j=0}^{7} |G(u,v)| = \frac{1}{2} \sum_{i=0}^{7} \sum_{j=0}^{7} \sigma_{G}(u,v) \sqrt{2}
\]

\[
\text{SATD} = 64 \sigma_{Q} \sqrt{2}
\]

\[
\text{SATD} = \frac{109}{32} \text{SAD}
\]

QCIF \( TH(QP) = 0.113 \times QP^3 - 7.36 \times QP^2 + 176.44 \times QP - 1393.16 \)

CIF \( TH(QP) = 0.0886 \times QP^3 - 5.31 \times QP^2 + 113.43 \times QP - 783.44 \)

720p \( TH(QP) = 0.0886 \times QP^3 - 5.31 \times QP^2 + 121.94 \times QP - 953.75 \)