**Introduction**

**Coding of example prediction error blocks with H.264/AVC:**

<table>
<thead>
<tr>
<th>Highly correlated samples</th>
<th>Quantizer indices</th>
<th>Quantized prediction error</th>
<th>costs d_{TC} d_{TH}</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 15 -2 -10</td>
<td>0 2 -2 0</td>
<td>2 11 3 -14</td>
<td>577 573</td>
</tr>
<tr>
<td>3 15 -5 -16</td>
<td>0 0 0 0</td>
<td>2 11 3 -14</td>
<td></td>
</tr>
<tr>
<td>1 14 -2 -17</td>
<td>0 0 0 0</td>
<td>2 11 3 -14</td>
<td></td>
</tr>
<tr>
<td>2 16 2 -16</td>
<td>0 0 0 0</td>
<td>2 11 3 -14</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marginally correlated samples</th>
<th>Quantizer indices</th>
<th>Quantized prediction error</th>
<th>costs d_{TC} d_{TH}</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2 -3 -5 -1</td>
<td>0 0 -1 -1</td>
<td>3 3 -2 -5</td>
<td>1299 701</td>
</tr>
<tr>
<td>-1 -3 -5 -3</td>
<td>0 0 1 0</td>
<td>-6 0 -6 -3</td>
<td></td>
</tr>
<tr>
<td>-12 42 2 -4</td>
<td>0 0 1 1</td>
<td>-15 30 4 -2</td>
<td></td>
</tr>
<tr>
<td>-1 0 -3 0</td>
<td>1 0 -1 -1</td>
<td>-3 -2 3 -5</td>
<td></td>
</tr>
</tbody>
</table>

Measured costs: $d_{TC} = SSD_{TC} + \lambda \cdot R_{CAVLC}$

Theoretical costs: $d_{TH} = SSD_{TH} - \lambda \cdot id{ P( Block )}$

**Problem:** Blocks with marginally correlated samples are coded with too high costs

**Approach:**
Coding the blocks with marginally correlated samples by a vector quantizer (VQ)

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**Extended H.264/AVC hybrid video encoder**

**Features of the extended coder:**
- Transform coder:
  - CAVLC
- VQ:
  - 4x4 vectors are used for blocks with small power
  - 2x2 vectors are used for blocks with high power
  - Codebook sizes $K_{ext} = 4096$ and $K_{2x2} = 512$
    - are used for broadcast quality
  - Huffman coding of representative vectors
- Side information: Choice of VQ or transform coder, applied codebook

**Experimental results**

**Extended decoder:**
Lower computational expense than H.264/AVC with CABAC

**Conclusions**

Compared to H.264/AVC with CAVLC: Up to 10% bit rate reduction

Compared to H.264/AVC with CABAC: Lower computational expense in the decoder