**Layer-Adaptive Mode Decision and Motion Search for Scalable Video Coding with Combined Coarse Granular Scalability (CGS) and Temporal Scalability**


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**Goal**
- JSVM perform mode decision by exhaustive search
- Complexity greatly increasing
- Eliminate computational redundancy between layers
- Coding 1 CGS layer takes 1.3-2.8 times more time than coding base layer

**Intra MB**
- Good predictor: MB partition of base layer
- Better-quality layer tends to use smaller partition

**Intra MB**
- IntraBL and intra8x8 dominate the intra predictions (More than 80%)
- Intra8x8 prediction type
  - More than 80% MBs have similar prediction directions
- Intra4x4 prediction type
  - More than 70% MBs have similar prediction directions

**Initial Search Point for Motion Estimation**
- MVD0 = [MV – MV from base layer]
- MVD1 = [MV – MV from Enh. layer]
- MV of base layer is a good predictor for larger partition
- MVP of Enh. layer is a better predictor for smaller partition

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**Layer-adaptive Mode Decision**
- Perform when base layer is not zero
- 50% MBs are coded with residual prediction
- 1/3 MBs with residual prediction are coded with BLSkip

**Proposed Algorithm**

<table>
<thead>
<tr>
<th>Layer</th>
<th>Layer Dependency for Encoding</th>
<th>Layer Dependency for Mode Decision, Qp</th>
<th>Best prediction modes in Layer M with Qp0</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGS Layer 3</td>
<td>Direct</td>
<td>Region 2: Qp0, In (34–51)</td>
<td>Inter prediction modes</td>
</tr>
<tr>
<td>CGS Layer 2</td>
<td>Direct</td>
<td>Region 0: Qp0, In (0–33)</td>
<td>Inter prediction modes</td>
</tr>
<tr>
<td>CGS Layer 1</td>
<td>Direct</td>
<td>Region 0: Qp0, In (0–33)</td>
<td>Inter prediction modes</td>
</tr>
<tr>
<td>Base Layer</td>
<td>Direct</td>
<td>Region 0: Qp0, In (0–33)</td>
<td>Inter prediction modes</td>
</tr>
</tbody>
</table>

**Look-up Table**

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<tr>
<th>Candidate modes in Layer M with Qp0</th>
<th>Best prediction modes in Layer M with Qp0</th>
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<tr>
<td>Direct</td>
<td>Region 2: Qp0, In (34–51)</td>
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**Selection Procedure for Reference Frame**

**Experiments**

**Performance Comparison**