Separable Convolution (One CL)

Communication time
Separable Convolution (Window = 10x10)

Communication Time (In Secs.)

Number of Processors

- 128 Speedup
- 32
- 16
- 8
- 4
- 0

14 16 32 64 128

- 0.05
- 0.04
- 0.03
- 0.02
- 0.01
Hough Transform Performance (One CL)

Hough Transform (Parameter Partitioning)

(....) Communication time

Computation Time

Processing Time (In Secs.)

Number of Processors

Speedup
Hough Transform Performance (One CL)

Hough Transform (Data Partitioning)

Computation Time

(....) Communication time

Processing Time (In Secs.)

Speedup

Number of Processors

0 10 20 30 40

0 10 20 30 40 50

1 4 8 16 32 64 128
Hough Transform Performance (One CL)

Hough Transform (Parameter and Data Partitioning)

- Speedup(PP)
- Communication Time (DP)
- Speedup(DP)

Communication Time (In Secs.)

Communication Time (PP)

Number of Processors
Hough Transform Mapping

- Data Partitioning
- Each processor computes vote counts for partial image
- Steps
  - Compute vote counts (all processors in parallel)
  - Combine partial results (all processors in parallel)
  - Distribute the accumulated vote count (one processor)
  - Report local maxima (all processors in parallel)

ACCUM_ARRAY(i,j) FOR ONE PROCESSOR
Hough Transform (Multiple Clusters)

Hough Transform (GICN)
Computation and Communication Time

Comp. Time

Time (Secs.)

Communication Times

Number of Processors (Cluster Size 16)
2-D Separable Convolution (Multiple Clusters)

2-D Separable Convolution (GICN)
(Window Size 10X10)

Speedup 64

Number of Processors (Cluster Size 16)
2-D Separable Convolution (Multiple Clusters)

![Graph showing % Degradation in Speedup vs Number of Processors (Cluster Size 8)](image)
2-D Separable Convolution (Multiple Clusters)

2-D Separable Convolution (GiCN)
Computation and Communication Times

Comp. time

Time (Secs.)

Comm. Times

Number of Processors (Cluster Size 16)
## Motion Estimation (Statistics)

<table>
<thead>
<tr>
<th>Image</th>
<th>no. of z. c. pattern pts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>l3</td>
<td>1870</td>
</tr>
<tr>
<td>r3</td>
<td>2123</td>
</tr>
<tr>
<td>l4</td>
<td>1950</td>
</tr>
<tr>
<td>r4</td>
<td>2069</td>
</tr>
</tbody>
</table>

Total number of points in each image = 65536

<table>
<thead>
<tr>
<th></th>
<th>stereo matching l3, r3</th>
<th>time matching l3, l4</th>
<th>stereo matching l4, r4</th>
<th>among l3, r3, l4, r4</th>
</tr>
</thead>
<tbody>
<tr>
<td>total unambiguous matches</td>
<td>366</td>
<td>205</td>
<td>137</td>
<td>137</td>
</tr>
</tbody>
</table>
Performance Evaluation

\[ T_{par} = t_{cp} + t_{cl} + t_{icl} \text{ (W/O I)} \]
\[ T'_{par} = t_{cp} + t_{cl} + w \times t_{icl} \text{ (WI)} \]

\( w \) depends on the product \( m \) and \( t_{icl} \)
where, \( m \) is the prob. of GM access (Patel 82)

\[ S_p = \frac{T_{seq}}{T_{par}} \text{ and } s'_p = \frac{T_{seq}}{T'_{par}} \]

\[ \text{Deg} = \frac{(w-1) \times t_{icl}}{t_{cp} + t_{cl} + t_{icl}} \]
Separable Convolution (One CL)

Separable Convolution (Window = 10x10)

Processing Time (In Secs.)

Computation Time

Speedup

(....) Communication time

Number of Processors