Expressing Optimisations as Rewrites

Toomas Remmelg  Michel Steuwer  Christophe Dubach
Math

\[ C_{ij} = (AB)_{ij} = \sum_k A_{ik} B_{kj} \]

Functional

\[ \text{val mm = fun (A, B) =>} \]
\[ \quad \text{map (fun (aRow =>} \]
\[ \quad \quad \text{map (fun (bCol =>} \]
\[ \quad \quad \quad \text{reduce (add, 0.0f, map (mult, zip (aRow, bCol)))} \]
\[ \quad \quad \)), transpose (B)))}, A) \]

Optimisation

Rewriting

Results

![Bar chart showing throughput (Gflop/s) for NVIDIA Fermi, NVIDIA Kepler, and AMD Tahiti versions of the code. The chart compares 'Generated' and 'MAGMA' versions.]
- Extracting features from the functional expression
- Building a statistical model
- Using it to guide the search