General-Purpose Code Acceleration with Limited-Precision Analog Computation

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Esmaeilzadeh, Sampson, Ceze, and Burger, “Neural Acceleration for General-Purpose Approximate Programs,” MICRO 2012
The compiler-circuit co-design enables analog circuits to efficiently accelerate conventional code.
3.7x \times 6.3x
\begin{align*}
\text{Speedup} & \quad \text{Energy Reduction} \\
\approx 23x & \\
\text{Energy-Delay Product} & \\
\text{Quality Degradation} & < 10.0\% 
\end{align*}
Last Session (Accelerators)

Wednesday at 10:40

$I_{out} = I_0 + I_1 + I_2$

Kirchhoff’s Law

$I(x_n) + V_o - R(w_n)$

$V_o = I(x_n) \cdot R(w_n)$

Ohm’s Law