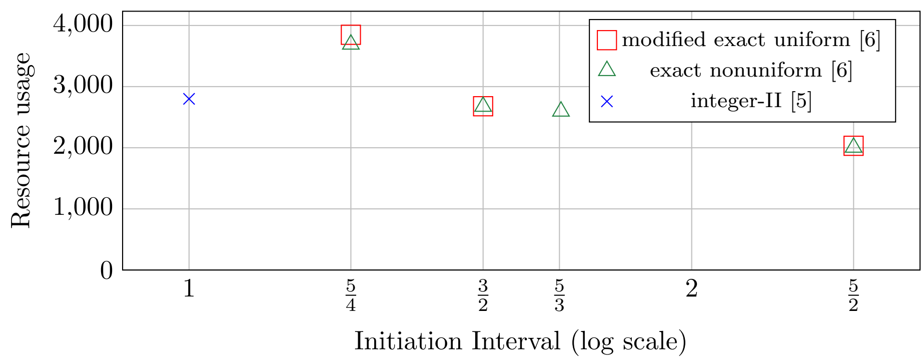

Figure 1: Resource usage RU for the gen benchmark

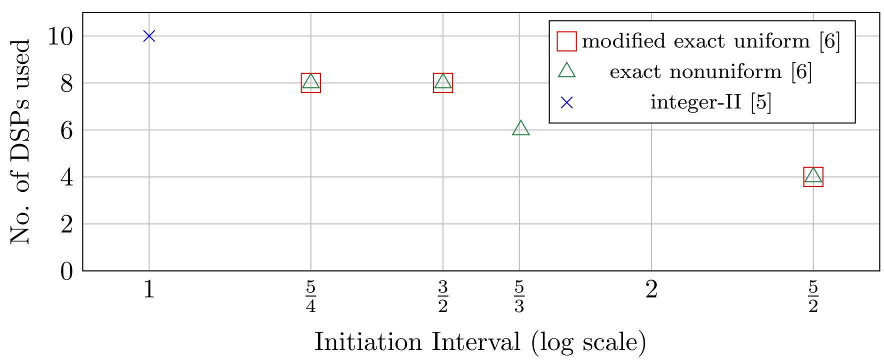

Figure 2: DSP usage for the gen benchmark

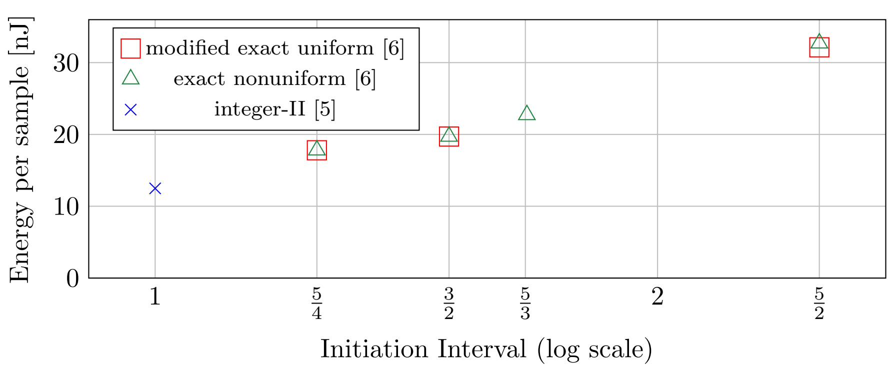

Figure 3: Energy per sample E_s for the gen benchmark

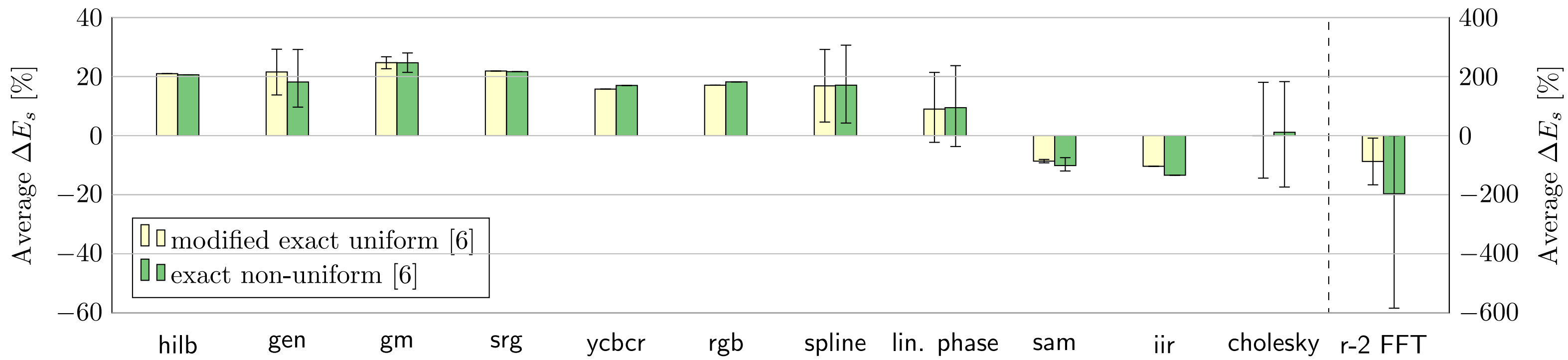

Figure 4: Average energy per sample savings ΔE_s for Pareto-optimal systems regarding resource usage and II implemented with the proposed exact uniform scheduler and the exact nonuniform scheduler from [6] compared to the best integer-II implementations using the scheduler from [5] for minimal resource allocations. Error margins denote minimum and maximum values. Benchmark size increases from left to right. The r-2 FFT benchmark instance belongs to the right y-axis; all other benchmark instances belong to the left one.

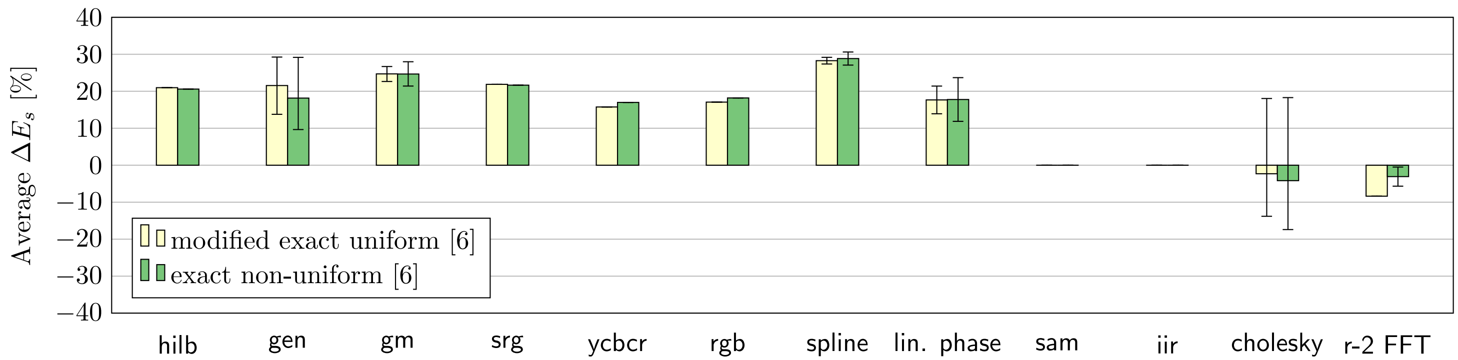

Figure 5: Average energy per sample savings ΔE_s for Pareto-optimal systems with $C \leq 5$. This leads to a reduction of the design space by 95.83 % and improved results for spline and lin. phase benchmark instances.

In Fig. 6 we show how the design space exploration can be sped up by skipping some resource allocations solely based on the resulting minimum II. We define

$$C = \frac{M}{speedup} = \frac{M \cdot \mathrm{II}_{\mathbb{Q}}}{\mathrm{II}_{\mathbb{N}}} = \frac{M^2}{S \cdot \lceil \frac{M}{S} \rceil} \tag{1}$$

with

$$speedup = \frac{\mathrm{II}_{\mathbb{N}}}{\mathrm{II}_{\mathbb{Q}}} \tag{2}$$

as a cost metric to decide whether to start the HLS flow or skip the allocation. Large values for M produce high interconnect costs due to large MUXs in the data path. Therefore, we choose to skip those allocations if the speedup due to choosing a rational II does not justify the MUX cost increase.

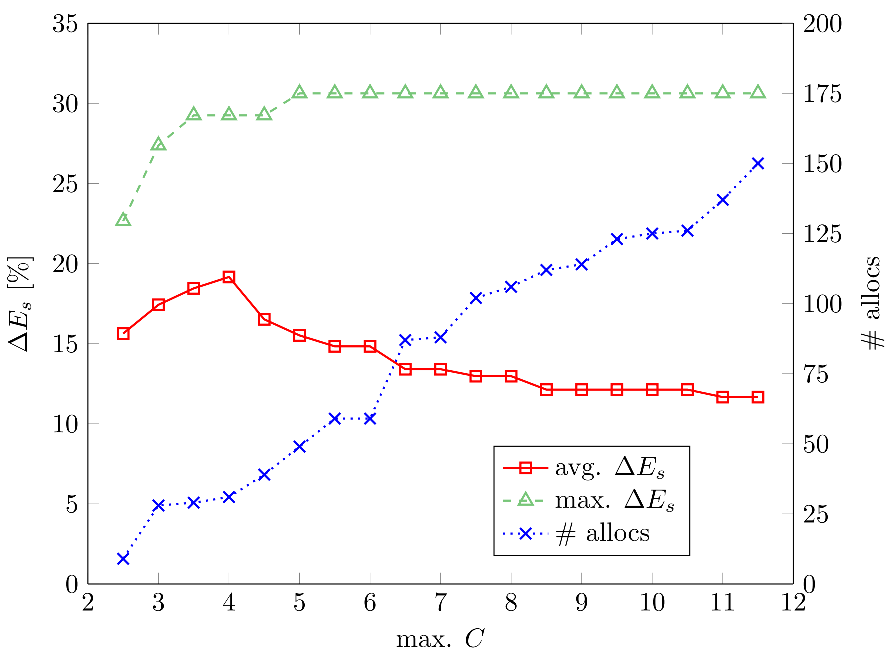

Figure 6: Comparing the average and maximum energy savings for various upper bounds of C. All allocations with $C >$ max. C are skipped.