

**Polash, Md Masbaul Alam; Newton, M. A. Hakim; Sattar, Abdul**  
**Constraint-directed search for all-interval series.** (English) [Zbl 1387.90225](#)  
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Summary: All-interval series is a standard benchmark problem for constraint satisfaction search. An all-interval series of size  $n$  is a permutation of integers  $[0, n)$  such that the differences between adjacent integers are a permutation of  $[1, n)$ . Generating each such all-interval series of size  $n$  is an interesting challenge for constraint community. The problem is very difficult in terms of the size of the search space. Different approaches have been used to date to generate all the solutions of AIS but the search space that must be explored still remains huge. In this paper, we present a constraint-directed backtracking-based tree search algorithm that performs efficient *lazy checking* rather than *immediate constraint propagation*. Moreover, we prove several key properties of all-interval series that help prune the search space significantly. The reduced search space essentially results into fewer backtracking. We also present scalable parallel versions of our algorithm that can exploit the advantage of having multi-core processors and even multiple computer systems. Our new algorithm generates all the solutions of size up to 27 while a satisfiability-based state-of-the-art approach generates all solutions up to size 24.

**MSC:**

[90C27](#) Combinatorial optimization

**Keywords:**

[all-interval series](#); [backtracking search](#); [constraint programming](#); [lazy constraint propagation](#)

**Software:**

[clasp](#); [Gelisip](#); [Kangaroo](#)

**Full Text:** [DOI](#)

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