PEQNP Python Library Benchmarks

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Abstract—The formulas that are generated by PEQNP Library represent some particular instances of the following Problems: Sum of 3 Cubes [1] and Maximum Constrained Partition [2].

I. INTRODUCTION

The PEQNP System its an automatic CNF encoder and SAT Solver for General Constrained Diophantine Equations and NP-Complete Problems, fully integrated with Python [3].

II. SAT COMPETITION 2021 BENCHMARKS

The collected formulas have generated with PEQNP Library for the following problems:

A. Sum of 3 Cubes

Let be $x, y, z \in \mathbb{Z}$ and $x^3 + y^3 + z^3 = t$ search for x, y, z. with $t \in \{87, 96, 91, 80, 39, 84, 75, 30, 52, 74\}$.

B. Maximum Constrained Partition

Given a finite set S of $2n$ elements in $\mathbb{N}$ decide if exist a partition of $X \cup Y = S$ with $X \cap Y = \emptyset$, $|X| = |Y|$ and $\Sigma X = \Sigma Y$.

III. INSTANCES

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maximum_constrained_partition_10_bits_n200.cnf
maximum_constrained_partition_11_bits_n200.cnf
maximum_constrained_partition_12_bits_n200.cnf
maximum_constrained_partition_13_bits_n200.cnf
maximum_constrained_partition_14_bits_n200.cnf
maximum_constrained_partition_15_bits_n200.cnf
maximum_constrained_partition_16_bits_n200.cnf
maximum_constrained_partition_17_bits_n200.cnf
maximum_constrained_partition_18_bits_n200.cnf
maximum_constrained_partition_19_bits_n200.cnf
sum_of_3_cubes_37_bits_87.cnf
sum_of_3_cubes_42_bits_96.cnf
sum_of_3_cubes_50_bits_91.cnf
sum_of_3_cubes_51_bits_80.cnf
sum_of_3_cubes_52_bits_39.cnf
sum_of_3_cubes_76_bits_84.cnf
sum_of_3_cubes_87_bits_75.cnf
sum_of_3_cubes_94_bits_30.cnf
sum_of_3_cubes_108_bits_52.cnf
sum_of_3_cubes_145_bits_74.cnf
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REFERENCES

[1] A compendium of NP optimization problems, Nikos Drakos, Ross Moore. http://www.csc.kth.se/ viggo/wwwcompendium/node152.html
[2] Which integers can be expressed as a sum of three cubes in infinitely many ways?, Mathoverflow. https://mathoverflow.net/questions/138886/which-integers-can-be-expressed-as-a-sum-of-three-cubes-in-infinitely-many-ways
[3] PEQNP Mathematical Solver, Oscar Riveros, http://www.peqnp.com