README

Introduction

This is the C++ code of the algorithms in the paper "Finite orbits of the pure braid group on the monodromy of the 2-variable Garnier system" by P. Calligaris and M. Mazzocco.

Requirements

`clang++` (Apple LLVM version 5.1 (clang-503.0.40)).

Installation

All algorithms need to be compiled.

1. Unzip the file "`Algorithms_.zip`" in a directory.
2. Execute the command "`make all`" to compile all the algorithms.
3. Change to the directory "`./bin`".
4. Execute the desired algorithm.

Description

List of algorithms with their input and output files:

1. "`algorithm_1_expansion_algorithm.cpp`":
   - Content: source code of Algorithm 1 ("Expansion Algorithm").
   - Output file: "`E45`".
2. "`matching_algorithm_2_C_E45_E45_E45.cpp`":
   - Content: source code of Algorithm 2, matching E45xE45xE45.
   - Input file: "`E45`".
   - Output file: "`C_E45_E45_E45`".
3. "`matching_algorithm_3_C_OID_OID_E45.cpp`":
   - Content: source code of Algorithm 3, matching OIDxOIDxE45.
   - Input file: "`E45`".

- Output file: "`C_OID_OID_E45`".

4. "`matching_algorithm_4_C_ORED_E45_E45.cpp`":
   - Content: source code of Algorithm 4, matching OREDxE45xE45.
   - Input file: "`E45`".
   - Output file: "`C_ORED_E45_E45`".
5. "`matching_algorithm_5_C_OID_E45_E45.cpp`":
   - Content: source code of Algorithm 5, matching OIDxE45xE45.
   - Input file: "`E45`".
   - Output file: "`C_OID_E45_E45`".
6. "`algorithm_6_check_not_relevant.cpp`":
   - Content: source code of Algorithm 6. It deletes not relevant points.
   - Input file: "`C_E45_E45_E45, C_OID_OID_E45, C_ORED_E45_E45, C_OID_E45_E45`".
   - Output file: "`C_prime`".
7. "`algorithm_7_check_finite_orbits.cpp`":
   - Content: source code of Algorithm 7. It deletes points in C' that not lead to finite orbits.
   - Input file: "`C_prime`".
   - Output file: "`C0`".
8. "`algorithm_8_quotient_wrt_P4.cpp`":
   - Content: source code of Algorithm 8. It quotients the set C0 w.r.t. the action of the group P4.
   - Input file: "`C0`".
   - Output file: "`C1`".
9. "`algorithm_9_quotient_wrt_signs_and_perms.cpp`":
   - Content: source code of Algorithm 9. It quotients the set C1 w.r.t. the action of the group $\langle \mathrm{sign}_1, \ldots, \mathrm{sign}_4, (12)(34), (1234) \rangle$.
   - Input file: "`C1`".

- Output file: "`C2_prime`".

10. "`algorithm_10_gen_subsets_AN.cpp`":

    - Content: source code of Algorithm 10. It generates subsets A_N s.t. each element in A_N has the same $(p_1, p_2, p_3, p_4, p_\infty)$ up to signs and permutations. We act with the group:

      $$\langle \mathrm{sign}_1, \ldots, \mathrm{sign}_4, (12)(34), (1234) \rangle,$$

      extended with the generator $\mathrm{P}_{1\infty}$.
    - Input file: "`C2_prime`".
    - Output: print the points p on screen.

11. "`algorithm_11_quotient_wrt_P13P23P34.cpp`":

    - Content: source code of Algorithm 11. It quotients each subset $\mathrm{A_N}$ w.r.t. the action of the group $\langle \mathrm{P}_{13}, \mathrm{P}_{23}, \mathrm{P}_{34} \rangle$.
    - Input: written in the preamble of the file.
    - Output file: "`C2`".

12. "`finite_monodromy_groups.cpp`":

    - Content: source code to calculate finite monodromy groups.
    - Input: written in the preamble of the file.
    - Output: print order of monodromy groups on screen.

List classes:

1. "`pvi.cpp`":

    - Content: the braid group B_3, the pure braid group P_3, the symmetry group $\mathrm{G_{PVI}}$ and the Jimbo-Fricke cubic.

2. "`g2.cpp`":

    - Content: the braid group B_4, the pure braid group P_4, the symmetry group G and the family of polynomials constraints $f_1, \ldots, f_{15}$.

List of static libraries:

3. "`custom_library.cpp`":

    - Content: useful functions as print a point on screen or save a collection of points on a file.