New Gadget Code Description

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Abstract

This document contains the medium level detail description of the python code for generating 36k Adinkras and New Gadget values. Brief intro simple paragraph at the beginning of the document.

This document write up contains the description of the software code algorithm that is used to calculate the New Gadget for the entire BC4 Coxeter group space of 36,864 Adinkras and how it is written and executed using Python 3. Specific Python version used in calculation was Python 3.5, but the code is also compatible with Python 2.7. Software wise the code builds upon earlier developments/works by the author but with changes to the code that pertains to the final gadget calculation. To speed up Gadget calculation, multiprocessing feature has been added and is utilized within the code. The code also now produces a text output of the results which can be zip compressed for distribution/sharing of results.

Utilizing the BC4 Coxeter group space, the adinkra_nxn_constructor.py code creates the 384 L sign permutation matrices. These L sign matrices serve as the building blocks of all Adinkras, given that any two of them satisfy conditions of a set Garden algebra equations. Once the 384 L matrices are created, for each L matrix the script builds a list of compatible matrices that satisfy Garden Algebra conditions. For 384 L matrices, counting all possible matrix position permutations, there is a grand total of 36,864 Adinkras with N=4 or four color, four open node and four close node.

For calculating the Fermionic Holoraumy matrices the script fx_vij_holoraumy.py is used. This script takes the input of 36,864 Adinkras and for each Adinkra generates a set of six V Holoraumy matrices. This script can generate the V Fermionic Holoraumy matrices and the V Bosonic Holoraumy matrices as

well as calculate the elle coefficients for V Fermionic Holoraumy matrice. This depends on the calculation configuration/setting used in run_adinkra_calc.py script.