Apr 8th, 11:00 AM - 12:00 PM

2-(51, 6, 1) Block Designs

Wenting Zhao
Illinois Wesleyan University

Mark Liffiton. Faculty Advisor

Follow this and additional works at: http://digitalcommons.iwu.edu/jwprc

Part of the Computer Sciences Commons

Zhao, Wenting and Liffiton. Faculty Advisor, Mark, "2-(51, 6, 1) Block Designs" (2017). John Wesley Powell Student Research Conference. 1.
http://digitalcommons.iwu.edu/jwprc/2017/oralpres8/1

This Event is brought to you for free and open access by The Ames Library, the Andrew W. Mellon Center for Curricular and Faculty Development, the Office of the Provost and the Office of the President. It has been accepted for inclusion in Digital Commons @ IWU by the faculty at The Ames Library at Illinois Wesleyan University. For more information, please contact digitalcommons@iwu.edu.

©Copyright is owned by the author of this document.
A graph decomposition problem is a classical problem in combinatorics that involves breaking a large graph into small identical pieces. Mathematicians have a long history working on this type of problem, but many of the problem instances still remain unsolved. The major difficulty is that the search space for an answer is usually massive; to check every potential solution manually would take more than a lifetime (or the lifetime of the universe, even!). In this work, we are interested in looking at this old problem in a new way -- we explore it from a computational perspective. Computers are known to be great at doing repetitive tasks -- can we come up with a procedure for a computer to follow, or, say, encode the problem in a way a computer can understand, so that we could use a computer to solve it? We addressed the above questions by translating the graph decomposition problem into the Boolean Satisfiability Problem (SAT), a well-studied problem in computer science. Many efficient algorithms have been proposed in the past two decades. We explore whether the recent advances in the field enable us to solve more unknown cases in the graph decomposition problem.