Curriculum Vitae

Jean-Pierre (J.P.) Appel

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Education

Moravian University **Bethlehem, Pennsylvania — 2019-2024**

B.S. Mathematics and Computer Science, with Departmental Honors
Thesis: "*Application of Quotient Graphs in Total Domination*"
Advisors: Dr. Shannon Talbott, Dr. Benjamin Coleman

Presentations

Talks

Exploring Toggle Games on Graphs Bethlehem, Pennsylvania — November 2023

Moravian University Mathematics Society Epsilon Talk

Toggle: a combinatorial game based on Lights Out Easton, Pennsylvania — July 2023

Joint Moravian and Lafayette REU Workshop

Posters

Exploring Toggle Games on Graphs Portland, Oregon — October 2023

SACNAS NDiSTEM Undergraduate Poster Session

k-Total Bondage on graphs Tampa, Florida — August 2023

Mathematical Association of America Mathfest Undergraduate Poster Session

Research Experience

Honors Program

Moravian University January 2024 – November 2024
Application of Quotient Graphs in Total Domination
Abstract:
Determining the Total Domination Number of a graph is a NP-Hard problem, with the time to generate a solution scaling impractically unless P = NP. This thesis seeks to improve the real-world runtimes of existing Total Domination algorithms by introducing a preprocessing step. We develop a novel similarity measure

between vertices, which enables our algorithm to condense graphs while retaining relevant characteristics. Our approach is based on the concept of quotient graphs, but is less restrictive. In the worst case, our algorithm's runtime scales quadratically with graph order, offering a preprocessing step that may enhance existing algorithms.

REU/SOAR

Moravian University Summer 2023
k-Total Bondage on graphs

- Published several OEIS sequences and proved a game's complexity class
- Explored k-Total Bondage number of graphs
- Studied combinatorial games played on graphs

Work Experience

Computer Science Lab Assistant January 2023 – May 2024
Moravian University

- Assist students during labs
- Answer questions relating to homework or projects
- Help with demonstrations

Computer Science Grader September 2023 – December 2023
Moravian University

- grade labs
- grade quizzes

Physics Peer Assisted Study Session Leader August 2020 – December 2020
Moravian University

- Create weekly problem set
- Answer questions relating to homework
- Run exam prep sessions

Publications

All publications are listed in alphabetical order unless otherwise specified

OEIS Sequences

A364503 Jean-Pierre Appel, Patrick Cesarz, Djeneba Diop, Eugene Fiorini, Nathan Hurtig, and Andrew Woldar
Toggle on paths from A364489 where paths with an even number of vertices are odious, or paths with an odd number of vertices are evil.

A364489 Jean-Pierre Appel, Patrick Cesarz, Djeneba Diop, Eugene Fiorini, Nathan Hurtig, and Andrew Woldar
Values of n for which the Sprague-Grundy value of Heat-Charge Toggle on an $(n+2)$-vertex path with initial weights $-1, 1^n, -1$ is evil for odd n or odious for even n.

A363934 Jean-Pierre Appel, Patrick Cesarz, Djeneba Diop, Eugene Fiorini, Nathan Hurtig, and Andrew Woldar
$T(n, k)$ is the Sprague-Grundy value for the Heat Toggle game played on an $n \times k$ grid where each vertex has initial weight 1.

Honors and Awards

Marlyn A. Rader Memorial Prize — Moravian University — April 2024
Awarded to a senior mathematics student with an in major GPA of 3.7+ and outstanding coursework, including advanced classes.