

Words from the Editor

As the Editor, I am thrilled to introduce the latest issue of the Intelligence Planet Journal of Mathematics and Its Applications. This edition features three exceptional articles authored by high school students who have demonstrated remarkable insight and ingenuity in their mathematical explorations. The articles in this issue span several mathematical topics, showcasing the breadth and depth of young mathematical talent. Below is a brief overview of the articles included in this issue:

Distinguishing 19th Century British Novels by Women Authors Using Natural Language Processing

By Phoebe Xu

In this innovative paper, Phoebe Xu leverages the power of Natural Language Processing (NLP) to distinguish between books written by 19th-century British women authors. Utilizing the BERT model alongside binary logistic regression, Phoebe investigates the capability of artificial intelligence to discern authorial differences and identify key distinguishing words within the texts. The study focuses on two books each by Jane Austen, Mary Shelley, and Mary Brunton, dividing them into uniformly sized sections for training and testing the BERT model. The results are impressive, with the model achieving an accuracy of 84.44%. A z -test confirmed the statistical significance of these findings. Furthermore, binary logistic regression highlighted the most distinctive words for each book, providing deeper insights into the authors' unique writing styles.

Constructing All Convex Shapes Using a Modified Version of the Traditional Chinese Tangram Puzzle

By Matthew Zhang

Matthew Zhang takes us on a fascinating journey into the world of geometric puzzles with his exploration of convex shapes using a modified version of the traditional Chinese Tangram puzzle. While it is widely known that the classical Tangram puzzle yields 13 convex figures, Matthew demonstrates that his variant produces 11 convex shapes. A significant contribution of this work is the establishment that all border vertices of any convex tangram figure must lie on a single lattice. Matthew develops a computer program to solve relevant Diophantine equations and inequalities, identifying potential candidate polygons. Each candidate polygon is then meticulously examined through manual construction to determine its validity as a tangram figure.

Complete Quadrilaterals: Exploring the Elegance of Geometry

By Lucas Lin

Lucas Lin delves into the intricate world of complete quadrilaterals, presenting an elegant exposition that bridges classical geometry and modern mathematical understanding. His article examines the geometric structure of complete quadrilaterals through the application of Menelaus' theorem, harmonic points, Miquel points, Newton line, and Gauss-Bodenmiller theorem. The

discussion is enriched with a detailed illustrative example, making complex geometric concepts accessible and engaging. Lucas's exploration not only highlights the beauty and elegance inherent in geometric relationships but also provides a thorough analytical framework for understanding these fascinating shapes.

Each article in this issue exemplifies the high level of intellectual curiosity and analytical rigor that we aim to foster in young mathematicians. We are proud to present these works, which contribute significantly to the fields of mathematical research and its applications. I invite you to delve into these articles and join us in celebrating the achievements of these talented students.

Enjoy reading!

Sincerely,

Kevin Wang, Ph.D.

Editor-in-Chief

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