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Special Issue on

Computational Techniques in Machine learning, Fuzzy Systems, Image Processing and Signal Analysis

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FOREWORD

The special issue of **Journal of Interdisciplinary Mathematics (JIM) Volume 28, Issue 1**, is dedicated to showcasing recent advancements in the fields of mathematical optimization, computational methods, topology, and applied mathematics. This issue brings together a collection of research that addresses contemporary challenges in these areas, offering both theoretical developments and practical applications.

We received over 100 high-quality submissions for this special issue, reflecting the ongoing innovation and research activity in these critical domains. After a rigorous peer-review process, 40 papers were selected for publication. These papers represent a diverse range of topics, from numerical analysis and optimization techniques to advancements in topology and applied mathematical models.

Highlights of the selected works include:

- **Optimization and Numerical Methods:** Novel techniques, such as improved BFGS updates for solving unconstrained optimization problems, adjustments for quasi-Newton methods, and innovative secant methods for single-variable optimization.
- **Computational Techniques in Image Processing and Signal Analysis:** Methods for removing impulsive noise using conjugate gradient approaches and trigonometric approximation of signals in specific function spaces.
- **Advances in Topology and Algebra:** Contributions in paracompact spaces, micro-topological structures, and closure operators associated with digraphs, along with results in topological dynamics and separation axioms.
- **Mathematical Modeling and Applications:** Models for epidemics using differential equations, gas sensors based on optical dielectric constants, and new algorithms for ant colony optimization implemented in Python.

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- **Applied Mathematical Solutions:** Analysis of the Schrödinger equation in peridynamic models, approximation by Fourier series, and survival transformation distributions with applications in reliability engineering.

This special issue demonstrates the richness and diversity of current research in mathematics and its applications. The selected papers provide significant contributions to their respective fields, offering both fundamental insights and methodologies that can be applied across various scientific and engineering disciplines.

The guest editors of this special issue would like to express their gratitude to the authors for sharing their valuable research and to the publication partner for their support in bringing out this special issue of the esteemed journal. Guest editors especially thank Prof. B. K. Dass, Chief Editor, for his guidance and encouragement throughout the process. This issue, entitled "**Computational Techniques in Machine learning, fuzzy systems, Image Processing and Signal Analysis**", is published in the *Journal of Interdisciplinary Mathematics (JIM)*, published by "Taru Publications," New Delhi.

We hope that this collection will inspire further exploration and foster innovation among researchers and practitioners in the field.

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