Introduction to Volume 12 Issue 1

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FOREWORD

This issue of the journal contains two major articles and five articles summarizing the research experiences of students. Toolin, Dion, and Erickson describe a newly created computer science licensure program for preservice teachers. They review the need for computer science courses in the curriculum and various efforts to license teachers. They then summarize the work of their collaborative at the University of Vermont to create and implement a CS licensure program for preservice teachers.

The paper by Sharma presents an end to end data science application where students in an introduction to scientific computing class apply machine learning to identify and classify images of chemistry laboratory glassware. Students collected pictures of a variety of glassware and then used several neural network applications in the Wolfram language to classify the pictures. This machine learning example helped students to understand the potential use of such techniques across their STEM disciplines.

Rivera and Araya summarize an analysis of the turbulent boundary layers related to supersonic flight. They used computational fluid dynamics software to model several of the related boundary flow conditions for this system.

Adewale compares the performance of serial and parallel ray tracing techniques. He used OpenMP with C++ to implement a parallel version of the ray tracing routines that was 10 times faster than the serial version.

In their article, Barragan and Groves describe the use of machine learning with a neural network to evaluate the energies in chemical structures. They compare several approaches to using the neural network that help to improve its predictive accuracy.

Noneman et al. use molecular dynamics and Monte Carlo simulations to explore the behavior of buckminsterfullerene in water. They compare seven models for the self-assembly of this molecule.

The final student article by Kaman, Edwards, and McGarigal compares several models of turbulent mixing of two fluids. They explore the runtime behavior of the codes using MPI and a hybrid MPI, OpenMP parallel programming model.