Prashant Gupta   prashant.gupta@wsu.edu
pragup.github.io   Ph: 509-339-9093

EXPERIENCE

Oak Ridge National Laboratory (ORNL)   Knoxville, TN
Research Intern   *May–Aug 2018, Jun–Dec 2017*
- Developed an *optimal tool path traversal algorithm* that uses IP (integer programming) model, based on traveling salesman problem (TSP) for any dense infill problem in 3D printing. Implemented in **Python** / **C++**, using **CPLEX**.
- Developed **C++** module to do *Euler transformation* of Triangle mesh and integrated it with ORNL SLICER 2.
- Tested and integrated variable density hexagonal meshing library in **C++** for ORNL SLICER 2.

NEi Software   Westminster, CA
Finite Element Analysis intern   *May 2013–Aug 2013*
Integrated and tested a nonlinear optimization solver, **IPOPT** on NEi Nastran that gives better performance in terms of checkerboard and symmetry of design when forces are symmetric.

Washington State University   Pullman, WA
Graduate Researcher   *May 2016–present*
- Developed novel *mathematical theory* using combinatorial topology and graph theory as well as *polynomial time algorithms* to generate continuous tool path using Euler transformation with no crossover for arbitrary infill lattice problem in 3D printing. Implemented the complete framework in Python.
- Proved NP-Completeness of dense fill 3D printing problem and developed scalable algorithms to solve large instances. Implemented in Python using CPLEX. Sample sizes: Buddha 799,716 nodes/169 layers, Bunny 812,733 nodes/360 layers.
- Developing a stable Mapper (from topological data analysis) algorithm for high dimensional data visualization.
- First author on three manuscripts (see PUBLICATIONS below).

Washington State University   Richland, WA
Graduate Research   *Jan 2015–May 2016*
- Developed a **C++** module in lammps from scratch for nanoscale fluids, works for both shared memory and distributed shared memory systems.
- Developed a **C++** tool that captures 3D geometry projections on any plane in 3D during simulation in lammps and a **C** tool to handle pre and post processing for lammps involving multiple formats.

PROJECTS

Text Classification using Convolution Neural Network (CNN): Implemented CNN for sentimental analysis of Text data in **Python** using **TensorFlow** and evaluated on Movie Review Dataset on Kaggle with accuracy 62.2% , ranked in top 300(post competition).
Letter recognition using Artificial Neural network (ANN): Implemented a scalable binary classification algorithm in **Matlab** using ANN with one hidden layer, on UCI dataset of English letters with accuracy of 93.9% compared to original paper with 80% accuracy.
T**opological Data Analysis using Mapper algorithm**: Implemented Mapper algorithm in **Python** for detecting Topological features such as flares which cannot be identified by a standard principal component analysis**.**

EDUCATION

Washington State University
PhD in Applied Mathematics   *Jan 2015–present*
Relevant Coursework: Non-Linear optimization I & II, Network Optimization, Advanced Matrix Computations, Integer and Combinatorial Optimization, Structured Prediction, Artificial Neural Networks, Deep Learning, Bayesian Analysis, Distributed Systems Concepts and Programming, Parallel Computing, Computational Topology
University of Colorado at Boulder
MS in Simulation based Mechanical Engineering Science   *Aug 2012–Dec 2014*
Relevant Coursework: Numerical Methods, Applied Mathematics I & II, Markov processes, Queues, and Monte Carlo Simulations.

TECHNICAL SKILLS   OpenMP, open MPI, NumPy, Pandas, Cplex, lpsolve, Caffe, TensorFlow

PUBLICATIONS

1. Prashant Gupta, Bala Krishnamoorthy, Euler Transformation of Polyhedral Complexes, 2018, submitted, arXiv: 1812.02412 .
2. Prashant Gupta, Bala Krishnamoorthy, and Gregory Dreifus. Continuous toolpath planning in a graphical framework for sparse infill additive manufacturing. Computer-Aided Design, 127:102880, 2020, arXiv: 1908.07452 .
3. Prashant Gupta, Bala Krishnamoorthy, Narasimha Boddeti, SFCDecomp: A Space-Filling Curve Based Domain Decomposition Method for Multicriteria Optimized Toolpath Planning in 3D Printing, 2020, submitted.