

YIYAN ZHANG

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EDUCATION

The Pennsylvania State University, PA.

May 2021(Expected)

- Double major: Bachelor of Science, Statistics (subplan: Biostatistics) and Mathematics (subplan: System analysis)
- GPA: 3.97/4.0
- Relevant Courses: Practical Bioinformatics, Biological network analysis, Applied Time Series Analysis, Computational Statistics, Linear Algebra, Deep learning Algorithm, Mathematical Statistics

RESEARCH EXPERIENCE AND COURSE PROJECTS

Dissimilarity-Overlap Curve analysis on data from gut and skin microbial samples of twins 01/2021-present

Supervised by Professor Emily Davenport, PSU

- Convert MATLAB codes in the article *Universality of Human Microbial Dynamics* (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4902290/>) to R codes, optimize the codes so that it can realize more data analysis in the reasonable time.

Constructed website about genetic information database for non-professionals

09/2020- Present

Supervised by Professor Jean-Paul Armache, PSU

The website provides information about gene sequence in different species, related mutation research literature, gene 3D model, pdbID, etc.

- Responsible for the design of database information content and python and Django building for 3D modeling PDB files and sequence alignment;
- Responsible for algorithm design of related literature information retrieval;

Course Projects

Training MgNet on Cifar-10 dataset to achieve 95% accuracy in deep learning algorithm Summer 2020

MgNet is a unified model that simultaneously recovers convolutional neural networks (CNN) for image classification and multigrid (MG) methods for solving discretized partial differential equations (PDEs).

- Trained it with Cifar-10, a famous image dataset, and gained the accuracy of both training and testing.
- Tried scheduled change of learning rate, increasing the iteration of each layer, increasing the number of parameters involved. 95% accuracy within 120 epochs was achieved

Solving the eigenvalues of tridiagonal matrices and its application in numerical computation Spring 2020

- Mathematically proved the short cut of the computation of tridiagonal matrices and used it to solve the earthquake

induced vibration problem in ideal case. Since assuming the free transverse oscillations satisfy a system of second order differential equations, the system involving parameters are a n -by- n tridiagonal matrix and two constants. With proved short cut, I convert the problem into solving a polynomial. Then, Newton's method and eigenvalue calculation in Python was introduced to finish this problem.

Comparing the root finding methods and generalize to 2D in numerical computation

Spring 2020

- Considered the problem of the shape of the inelastic cable between two electronic towers.
- Basing in a reality scenario, I compare bisection method, Newton's method, and secant method. Then, I generalized the newton method into two-dimension.

Study on Sierpinski triangle and Sierpinski carpet in graph theory

Spring 2020

- As an honor project, I conducted two representation of Sierpinski triangle and carpet under the advice of Dr. Bickle. In this project, I use graph theory and recurrence relationships to generalize the vertices and edge relationships for each kind of representation.

SKILLS

Statistical Software Packages: R and SAS

Programming Languages: Python and C++

Other: LaTeX

AWARDS AND CERTIFICATES

- Dean's List, Fall 2018-present
- Honors Program in Altoona campus, Fall 2019 and Spring 2020
- Pass SOA (Society of Actuarial) Exam P: Probability, May 2019
- President's Freshman Award in Penn State Altoona, 2019