Yanzi Liu

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EDUCATION

King's College London   09/2022–05/2025
B.Sc. Mathematics with statistics | Year 1 GPA: 3.6/4.0

Courses: Calculus I&II, Linear Algebra I&II, Sequences and series, Abstract Algebra, Dynamic Systems, Probability and Statistics I&II, ADE, Real Analysis, Number Theory, Metric Spaces and Topology, Classical Dynamics.

RESEARCH & PROJECTS

CLIP-DR: Textual Knowledge-Guided Diabetic Retinopathy Grading with Ranking-aware Prompting
Research Project | XJTLU | Advisor: Yanda Meng   01/2024–present
➢ We propose a new CLIP-based framework treating DR grading as an image-text matching problem and introduce a ranking-based fine-tuning strategy enabling the image encoder to learn the associations brought about by the natural ordering information Experimental results confirm the effectiveness of our approach, improving the performance of DR grading compared to many state-of-the-art alternatives.

Research on Random Learning Construction Methods for Neural Networks
Research Project | Nanjing University of Posts and Telecommunications| Advisor: Min Shi,   10/2023–01/2024
➢ The feedforward neural networks with random hidden nodes have drawbacks generating random parameters, we will propose a new data-driven method to construct iteratively the network structure.
- A new way of generating hidden node parameters in feedforward neural networks randomized learning is proposed.
- The results reveal that it successively generates new candidate hidden nodes and acceptance is adapted during training, accepting at the beginning of the training process only those nodes which lead to the largest error reduction.
- Constructive data-driven approach builds compact neural networks with relevant nodes.
- Compared with several alternative methods, our proposed approach has superior performance and outperforms its competitors in fitting accuracy.
- The results lead to a more compact network architecture, the redundant, random nodes, which are usually generated by existing randomized learning methods, are not accepted by the proposed method.
- Manuscript has been accomplished.

Complex Systems and Their Dynamics Theory and Computational Research
Research Project | Nanjing University of Posts and Telecommunications| Advisor: Min Shi,   06/2023–11/2023
➢ Developed and implemented a mathematical model with fractal structure to describe the dynamic behaviors of the velocity of blood flow in cerebral aneurysm at the circle of Willis.
- Investigate and discuss the problem of mathematical model in biological science.
- Principle of fractal structure is used to model the blood flow damping term that features the viscoelasticity of the blood flow behaving between viscosity and elasticity.
- Investigate the novel dynamic phenomenon of the system, explore the complex dynamic behaviors and obtain the bifurcation behavior with different system parameters.
- Use MATLAB and Simulink simulation to demonstrate rout of chaos with the hopful bifurcation diagram, and checked with a developed simple Lyapunov index, manuscript has been completed and preparing to submit to Communications on Pure and Applied Mathematics (CPAM 2024).

Dynamic programming and optimization algorithms
Research Project | Nanjing University of Posts and Telecommunications| Advisor: Min Shi,   10/2022–06/2023
➢ Proposes a dynamic material transportation scheduling strategy for Rail Guided Vehicle (RGV) in a single linear reciprocating CNC (computer number controller) machining system considering random faults based on the idea of maximizing efficiency. By fully utilizing the working time resources and efficiency of the processing system, the workpiece processing machine can be balanced and applied, and by combining 0-1 dynamic programming, greedy algorithms, etc., reasonable system operation rules and construction models can be defined.
- Propose the scheduling strategy of Rail Guided Vehicle (RGV) has a significant impact on the production efficiency of industrial production and processing systems.
- Combining the greedy algorithm concept, prioritize responding to the CNC feeding demand of the first process, and prioritize responding to the CNC waiting for the longest feeding time, to construct an effective algorithm.
- Design a random fault determination mechanism to achieve a dual process flow under random faults. Use MATLAB and Simulink simulation to construct the above algorithm process.
- Differential analysis of results obtained under dual process faults using SPSS.
- The significance of using homogeneity of variance test indicates that the variance of the data has significant differences. The results of single factor ANOVA analysis indicate significant differences between the data.

PUBLISHED PAPER

Two manuscripts (first author both) have been accomplished and preparing to submit to relational journal.

SKILLS

Python | MATLAB| R | Maple | M.S. Office (Excel, Access, Word, PowerPoint)