Shuyan Dong

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EDUCATION

University of Edinburgh **Scotland, UK** 09/2017-06/2021

Major: **Artificial Intelligence BSc (Hons)**

Core Modules: *Computation and Logic, Data and Analysis, Introduction to Linear Algebra, Foundations of Natural Language Processing, Computer Security, Computer Communications and Networks, Algorithmic Game Theory and its Applications*

University of Exeter **England, UK** 09/2021--

Program Title: **Doctor of Philosophy in Mathematics**

Research Synopsis: The performance of group behaviours through metaheuristic algorithms.

RESEARCH EXPERIENCE

2020.09-2021.05

Explore the firing rules of the Kenyon cells and a corresponding 'Kenyon field'
Under the supervision of Professor Babara Webb

- Investigated whether Kenyon cells in the Mushroom Body of the insect brain exhibit properties similar to place cells, which increase their firing rate in specific spatial locations.
- Start with a simulated neural network model of the Mushroom Body to analyze the firing patterns of Kenyon cells. Observed that each Kenyon cell demonstrates a preferred firing region within a given environment, suggesting spatially selective activity.

2020.01-2020.05

System Design Project

- Established a physical automatic sorting bin **Recylotron** with Raspberry Pi, which is designed to increase the ease and frequency of recycling.
- Responsible for architect designs, 3D modelling and hardware-related challenges.

2019.09-2020.12

PowerGrab Game Design

- Design a program that implements a PowerGrab game that uses an autonomous drone, which is able to play against a human component in a location-based strategy game.
- Implement an **object-oriented programming approach** to ensure the drone can engage in **both stateless and stateful game modes**, while accurately recording its flight path.

Job and Internship

2022.09 -- 2025.02

Postgraduate Teaching Associates (PTAs) at the University of Exeter

Course name:

- Tackling Sustainability Challenges Using Data and Models
- Trends in Data Science and AI

2020.05-2020.12

Seven months internship in the National Natural Science Foundation of China (Grant No.51904144)

- Collaborated with the project lead to optimize algorithms for parameter and function identification, enhancing computational efficiency and accuracy. Additionally, contributed to program debugging, ensuring robust performance and reliability.

ALGORITHMIC SKILLS

- Well-versed in supervised learning techniques, including support vector machines, linear discriminant analysis, k-nearest neighbour algorithm, decision trees, and clustering methods such as hierarchical clustering and k-means clustering.
- Proficient in statistical modelling and machine learning algorithms, including linear regression, logistic regression, Naïve Bayes, neural networks, and Hidden Markov Models.
- Strong interest in metaheuristic optimization, with ongoing research focused on utilizing Particle Swarm Optimization (PSO), Genetic Algorithms (GA), and Genetic Programming (GP) to optimize neural network weight training.

ADDITIONAL SKILLS AND ACHIEVEMENTS

Academic Skills

- Proficient in **Java, Python, Matlab, SQL, Basic 3D Modelling**
- Experience with **Festival (Speech Synthesis System from Edinburgh), MIPS (MARS)**
- **Core Machine Learning Methods** (Supervised, Unsupervised Learning)

  Reinforcement Learning (Q-learning, Actor-Critic)

  Generative AI (GANs)

  Computer Vision & NLP (CNNs)

  Time Series Analysis (ARIMA)

  Evolutionary Algorithms (GA, GP, PSO, ACO)

Teaching & Educational Skills

- Experience as a **Postgraduate Teaching Assistant (TA)** in **Tackling Sustainability Challenges Using Data and Models** and **Trends in Data Science and AI** responsible for tutorials, workshops and student supervision.
- Curriculum development experience in **Tackling Sustainability Challenges Using Data and Models** and **Trends in Data Science and AI**, including assessment and presentation marking.
- Commitment to completing the 1-3 Unit of Learning and Teaching in Higher Education (LTHE). Successfully obtained a **Certificate of Completion** for partial LTHE assessment. Upon completing all five units of the LTHE program, eligibility will be granted for recognition an Associate Fellow of the Higher Education Academy (AFHEA).

Research & Academic Achievements

- Published peer-reviewed journal on **Systems Science & Control Engineering.**
- Published conference papers at the **International Conference on Control, Automation, Robotics and Vision (ICARCV), IEEE** and the **International Conference on Automation and Computing (ICAC)**.
- Presented research at **ICARCV 2024**, **ICAC 2023** and the **Department of Earth and Environmental Sciences** (DEES) ECR seminar.

Academic and institutional matters Development

Acted as a **Postgraduate Research (PGR) Student Representative** for **CEM**, advocating for the needs and interests of research students. Played an active role in addressing key aspects of the **doctoral experience**

Publication:

S. Dong, S. Das, A. Thornton and S. Townley, "Control System Autonomy Improvement: An Attempt to Introduce Meta-Heuristic Algorithms into Closed-loop UAV Control Systems," Proceedings of the IEEE, *18th International Conference on Control, Automation, Robotics and Vision (ICARCV)*, Dubai, United Arab Emirates, 2024, pp. 454-459

S. Dong, S. Das, S. Townley (2024) 'Drone motion prediction from flight data: a nonlinear time series approach', *Systems Science & Control Engineering*, 12(1). doi: 10.1080/21642583.2024.2409098.

S. Dong, S. Das, S. Townley and A. Thornton, "Swarm Intelligence Based Drone Flocking Model," Proceedings of the IEEE, *28th International Conference on Automation and Computing (ICAC)*, Birmingham, United Kingdom, 2023, pp. 1-6