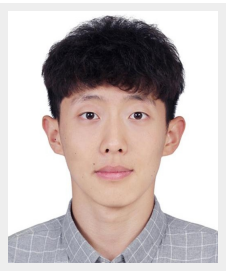
Zhaolin Yuan



Male | 28yrs old | Graduates | Doctor degree | +86 18810919727 | 18810919727@163.com | postdoctor position

Education

2013/09 - 2017/06 **University of Science and Technology Beijing, USTB** **Bachelor - Computer science**

GPA: top 10% in 130 students.

2017/09 - 2023/01 **University of Science and Technology Beijing (Direct PhD)** **Doctor - Computer science**

Expected graduation date: **2022/12**

2023/01 - Now **Huawei Academia Sinica-Network Technique Lab** **Postdoctoral Researcher**

Research Topics: Network flow modeling, Root Cause Identification

Research fields

Dynamical system modeling, Model-based reinforcement learning, Industrial system optimization, Time series analysis, Causal Discovery

Projects & Researches

2021/05 - 2021/11 **Root Cause Analysis for Private Cloud-Network Platform** **Researcher**

In private cloud platforms, topological relationships between devices and micro-services are always lost seriously. To identify root alarms under incomplete calling graphs, I developed a root cause analysis system based on data-driven causal discovery. The proposed technique uses the causal discovery algorithm to restore the calling chain relationships between different entity types (nearly 90 species) and different entities (200,000 species) from temporal alarm events. Now, the efficiency of the system has been tested the and it is providing services for an operation and maintenance management system in an airport.

2021/05 - 2021/11 **Optimizing the power consumption for the cooling system in a data center** **Researcher**

In order to optimize the cooling system of a data center in IMT Atlantique, inspired by the **continuous-time jump system and ODE-net,** I propose **Autonomous Jump Ordinary Differential Equations Network(AJ-ODE)** to identify the cooling system with periodic transitions in multi-stages. The model learns the dynamical properties of the system by the offline trajectories and prior knowledge. By simulating the inlet temperature and power consumption with the trained

model, we infer a better cooling policy that **reduces the power consumption of the cooling system by 20%**.
Related theory and techniques: Deep learning, ODE-net, Dynamical system modeling.

2019/05 - Now	**Data-based modeling and RL control for complicated industrial system**	**Researcher**

1. To model **industrial systems with long-time delay, nonlinearity, and stochasticity** from irregularly sampled offline data, I propose the **Ordinary Differential Equation Recurrent State Space Model (ODE-RSSM)** based on **temporal variational auto-encoder and differential neural networks**. The paper is acceptedby the conference AAAI2023.
2. Most adaptive industrial controlling techniques suffer from **slow learning and the high cost of trial and error**. Based on offline reinforcement learning, I propose an effective pipeline to learn control policy (DDPG) from offline system trajectories and optimize the model parameters in online production. At a copper mine in Zambia, Africa, the proposed technique is employed to **control the underflow concentration of deep cone thickener** and **the tracking error is 20% lower than the manual strategy.**
Related theory and techniques: Offline & Model-based Reinforcement learning, Model Predictive control.

2018/02 - 2018/06	**Expert system of Copper smelt ISA furnace**	**Researcher**

Based on **thermodynamic simulation software and machine learning algorithms**, I develop a **copper smelt expert system** for optimizing **mineral ratio and technological parameters** including oxygen, Ca, Si, C, and feed quantity. The system reduces the relative error of matte taste to 0.5%. The original relative error is about 2% when the ingredients and parameters are designed manually.
Related techniques: KNN, C#.

2019/05 - Now	**Intelligent control and decisions for paste backfilling in metal mine**	**Leader(10 members)**

This project belongs to the **National Key Research and Development Program of China**. I am a leader of a group of 10 people to develop a B/S paste backfilling management system in mining production.
Functions: Intelligent control, production management, visual detection, and real-time 3D backfilling visualization.
Responsibility: team management, technical route design**,** system prototype design, and control algorithm design.

Honors

- ACM-ICPC Asia Regional Contests: **Gold Medal * 1 (The only one in USTB)** , Silver Medal * 4 (2015-2017) ACM-ICPC EC-final/China-final: Silver Medal*1, Bronze Medal*1 (2015-2016)
- The Second prize of the Chinese Electronic Association for technological progress, 2022(Ranked first in the students)
- The **first prize** of science and technology of the Chinese Gold Association, 2020
- Honorary title of CCF “Understanding student” in 2016
- The 7th CCF Certified Software Professional(csp): score: 360(Full score: 500), Rate: Top 1.16%,
- 2016. First-class Scholarship*1,Second-class Scholarship*1,Third-class Scholarship*1, 2014-2016

- Outstanding Graduates Awards, University of Science and Technology Beijing, 2017

Publications

PhD thesis: Modeling and Controlling for complicated dynamical system based on deep differential equation

1. **Zhaolin Yuan**, et al. ODE-RSSM: Learning Stochastic Recurrent State Space Model from Irregularly Sampled Data. In Proceedings of the 37th AAAI Conference on Artificial Intelligence, 2023.(**CCF-A Conference**)
2. **Z. Yuan, Y**. Wang, X. Ban, C. Ning, H. -N. Dai and H. Wang, "Autonomous-Jump-ODENet: Identifying Continuous-Time Jump Systems for Cooling-System Prediction," in IEEE Transactions on Industrial Informatics, 2022, doi: 10.1109/TII.2022.3207835.(**IF:11.648**)
3. **Yuan Z**, Li X, Wu D, et al. Continuous-time prediction of industrial paste thickener system with differential ODE-net[J]. IEEE/CAA Journal of Automatica Sinica, 2022, 9(4): 686-698. (**IF: 7.847**)
4. **Yuan Z**, Ban X, Han F, et al. Integrated three-dimensional visualization and soft-sensing system for underground paste backfilling[J]. Tunnelling and Underground Space Technology, 2022, 127: 104578. (**IF: 6.407**)
5. **Yuan Zhao-Lin**, He Run-Zi, Yao Chao, Li Jia, Ban Xiao-Juan. Online reinforcement learning control algorithm for concentration of thickener underflow. Acta Automatica Sinica, 2021, 47(7): 1558−1571 doi:10.16383/j.aas.c190348 (**CCF-A Chinese recommended journal**)
6. **Yuan, Zhaolin**, et al. “A Dual-Attention Recurrent Neural Network Method for Deep Cone Thickener Underflow Concentration Prediction.” Sensors, vol. 20, no. 5, 2020, p. 1260. (IF: 3.847)
7. **Yuan, Zhaolin** et al. “Improving Word Representation Qu*ality Trained by word2vec via a More Efficient Hierarchical Clustering Method.” CDVE (2018).*
8. Jia Li, **Zhaolin Yuan**, Xiaojuan Ban: An Improved Reinforcement Learning Based Heuristic Dynamic Programming Algorithm for Model-Free Optimal Control. ICANN (2) 2020: 282-294. (CCF-C Conference)
10. Wang H, **Yuan Z**, Chen Y, et al. An industrial missing values processing method based on generating model[J]. Computer Networks, 2019, 158: 61-68. (IF: 4.474)