Zuokun OUYANG Ph.D.

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Recently graduated with a Ph.D., I specialize in the fusion of econometrics and machine learning, particularly in time series forecasting. My research area encompasses time series analysis, sequential learning, and econometrics, in which I bring a robust understanding of both theoretical concepts and practical applications. I am also a team player with a proven track record of collaborating with cross-functional teams to achieve business goals.

Education

University of Orléans — Orléans, France
Ph.D.[1], *Computer Science and Signal Processing* — *Oct. 2019 – Sept. 2023*

- Dissertation: *Time Series Forecasting: From Econometrics to Deep Learning*
- Supervisors: Prof. Philippe Ravier, Assoc. Prof. Meryem Jabloun

University of Orléans — Orléans, France
Diplôme d'Ingénieur[2], *Computer Engineering, Polytech Orléans* — *Sept. 2015 – Sept. 2018*
M.Sc., Computer Science — *Sept. 2017 – Sept. 2018*

- Dissertation: *A Fundamental Study on Deep Learning based Time Series Forecasting*
- Supervisors: Prof. Christel Vrain, Prof. Marcilio C. P. de Souto, Assoc. Prof. Sylvie Treuillet

Beijing Institute of Technology — Beijing, China
B.Eng., Electrical & Electronics Engineering — *Sept. 2012 – June 2016*

- Dissertation: *A Microphone Array-based System for Sound Source Localization*
- Supervisors: Assoc. Prof. Shiyong Li, Assoc. Prof. Rodolphe Weber

Professional Experience

University of Orléans — Orléans, France
Lecturer, Teaching for Engineering Program at Polytech Orléans — *Jan. 2023 – Sept. 2023*

- Signals and Linear Systems *(EPL3CI13)*.
- Introduction to Signal Processing *(EPL4CI04)*.
- Acquisition Systems *(EPL2IA01)*.
- Arduino & Embedded Systems *(EPL2CI03)*.

ATTILA Gestion — Lyon & Montargis, France
Data Scientist — *Oct. 2019 – Dec. 2022*

- Worked with cross-functional teams to develop a forecasting tool to support business decisions.
- Developed an evaluation framework to assess the performance of forecasting models on different sampling frequencies, seasonalities, and stationarity, under different forecasting strategies.
- Proposed STLformer, a Transformer-based time series forecasting model. It uses Spearman's ρ-based attention and STL decomposition, combined with the ARCH effect test, to achieve forecasting in $\mathcal{O}(N \log N)$. It outperforms SOTA methods on multiple datasets, especially on nonlinearly dependent series (e.g., financial series). Deployed in the internal forecasting tool.

ATTILA Gestion — Montargis, France
Data Scientist Intern — *Apr. 2018 – Sept. 2018*

- Assessed various internal metrics with time series tools to evaluate franchisees' performance.
- Systematically reviewed commonly used methods in time series analysis, e.g., ARIMA, ETS, Theta, and decomposition methods and assessed them on the company's data.

eContent Store Sàrl — Luxembourg
Software Development Intern — *June 2017 – Aug. 2017*

- Acted as one of the core developers of the Android development team.
- Implemented key enhancements and upgrades for AR functionalities, encompassing improved technique selection, natural feature training pipeline, and numerous bug fixes.
- Developed a WebGL tool for natural features training to improve rendering performance.
- Wrote design and related interface documentation, and user manuals for the WebGL tool.

[1] Industrial Ph.D. program contracted with ATTILA Gestion.

Skills

Programming: Python, R, C#, Java, C/C++, Swift, MATLAB, SQL
Frameworks & Tools: PyTorch, scikit-learn, Unity3D, OpenCV, PowerBI, Linux, Git
Skills & Expertise: Deep Learning, Machine Learning, Time Series Analysis, Econometrics, Causal Inference, Signal Processing, Optimization Theory, Non-linear Regression
Languages: English (proficient), French (proficient), Mandarin (native)

Selected Publications

1. **Z. Ouyang**, M. Jabloun, and P. Ravier, "Leveraging Rank Correlation and STL Decomposition for Transformer-based Time Series Forecasting," *Eng. Appl. Artif. Intell. (EAAI)*, 2023, (SCIE Q1, IF=8, in preparation).
2. **Z. Ouyang**, M. Jabloun, and P. Ravier, "A Contemporary and Comprehensive Survey on Time Series Forecasting," *IEEE Trans. Knowl. Data Eng. (TKDE)*, 2023, (SCIE Q1, IF=8.9, in preparation).
3. **Z. Ouyang**, M. Jabloun, and P. Ravier, "STLformer: Exploit STL decomposition and Rank Correlation for Time Series Forecasting," in *Proc. EUSIPCO*, 2023.
4. **Z. Ouyang**, M. Jabloun, and P. Ravier, "Rankformer: Leverage Rank Correlation for Transformer-based Time Series Forecasting," in *Proc. IEEE SSP*, 2023.
5. G. Ouyang, K. Abed-Meraim, and **Z. Ouyang**, "Magnetic-Field-Based Indoor Positioning Using Temporal Convolutional Networks," *Sensors*, vol. 23, no. 3, p. 1514, 2023, (SCIE Q1, IF=3.9).
6. **Z. Ouyang**, P. Ravier, and M. Jabloun, "Are Deep Learning Models Practically Good as Promised? A Strategic Comparison of Deep Learning Models for Time Series Forecasting," in *Proc. EUSIPCO*, 2022.
7. **Z. Ouyang**, P. Ravier, and M. Jabloun, "STL Decomposition of Time Series Can Benefit Forecasting Done by Statistical Methods but Not by Machine Learning Ones," *Eng. Proc.*, vol. 5, no. 1, p. 42, 2021.

Selected Projects

iOS Application *RestauRank* Mar. 2018 – Apr. 2018

- Developed a map App to locate top-rated local restaurants and determine the fastest route.
- Google Maps SDK and Google Geolocation API for map visualization, navigation, and reviews.

Archaeological Ceramic Decorations Segmentation Jan. 2018 – Mar. 2018

- Built 2D FCNs to segment decorated regions on ancient ceramic fragments using depth maps.
- Clustered segmented areas and preprocessed depth maps into distinct categories.
- Benchmarked the clustering results against other algorithms, including K-means and DBSCAN.

Plant ECGs Classification with CNN and SVM Oct. 2017 – Dec. 2017

- Sampled 400 plant ECG signals using BitScope and plant ECG sensor.
- Extracted four features from the ECGs and classified with 1D-CNN and SVM.
- Achieved 87% accuracy with 1D-CNN and 98% accuracy with SVM.

A Microphone Array-based System for Sound Source Localization Mar. 2016 – May 2016

- Developed a microphone array system with Python for sound source localization.
- Used Raspberry Pi, Arduino UNO, a stepper motor, and an eight-microphone array.
- Implemented DOA-TDOA & GCC algorithms for sound source localization.

Awards

- Erasmus+ Consortium Polytech, Polytech Orléans *2017*
- College Student Academic Scholarship, Beijing Institute of Technology *2012 – 2015*
- National 3rd Prize, Chinese Exhibition of Calligraphy and Painting for Undergraduates *2013*
- National 3rd Prize, The 25th Chinese Chemistry Olympiad *2011*
- Provincial 1st Prize, The 28th Chinese Physics Olympiad *2011*
- Provincial 1st Prize, The 20th China High School Biology Olympiad *2011*

Other Experience

- Volunteer, Chinese New Year Festivity, *Orléans and Yangzhou Government* *Feb. 2017*
- Vice President, *Association of Calligraphy of Beijing Institute of Technology* *2013 – 2015*

Hobbies

Basketball, Reading, Chinese Calligraphy, Singing, Fitness, and Cooking.

[2]The "Diplôme d'Ingénieur" is a highly accredited elite diploma in France. Equivalent to M.Eng. Only the top 10% of the students in the French Baccalaureate can apply for this education program in engineering schools. Students delve deep into engineering and science courses and receive management, economics, and social sciences education, ensuring they emerge as well-rounded professionals.