

# IEEE TRANSACTIONS ON NEURAL NETWORKS AND LEARNING SYSTEMS

Special Issue on

## Connectionist Methods for Finance and Blockchain

The rapid pace of technological and behavioral changes in the areas of finance and blockchain calls for multi-disciplinary research fostering innovation. The focus of this special issue is on connectionist methods that aim at performing better analyses, simulations, predictions, and testing in the areas of finance and blockchain. The special issue welcomes both theoretical and applied research papers.

Finance and economics are complex domains, in which disaggregated behavior is adaptive and the aggregate dynamics is highly non-linear. The resulting complexity is difficult to measure, learn, model, and control. The recent crisis revealed that the complex dynamics involves feedback loops and propagation channels at various scales across the system. In this context, connectionist methods, and often deep learning, have a proven track record in learning and predicting financial time series, in asset and derivatives pricing, in bankruptcy prediction, in modelling market mechanisms, and in systemic risk analysis.

Financial and economic systems are further experiencing the adoption of blockchain and cryptography innovations. They are transforming the function, security, and stability of financial systems, at various scales of interdependences, as well as improving fraud detection and crime prevention. Beyond this, blockchain-based services are implemented through smart contracts and decentralized autonomous organizations. Smart contracts require the design of adaptive behaviours and interactions of multiple intelligent agents within and among contracts. Recent connectionist applications involve ledger- network data analysis, and neural networks running on blockchain.

The special issue will feature the most recent developments in and the state-of-the-art of connectionist methods for finance and blockchain. The target audience includes both researchers from academia and practitioners from industry. The issue emphasizes the relevance of IEEE TNNLS to research and professional communities even beyond its current excellent standing.

We seek high quality contributions from academics and practitioners. Papers for the special issue are invited on but not limited to any of the topics listed below:

### *Theoretical Methods:*

- Bayesian Neural Networks
- Bi-directional Neural Networks
- Convolution Neural Networks
- Convolutional Recurrent Networks
- Cascading Neural Networks
- Deep Belief Networks
- Deep Neural networks
- Diffusion Neural Networks
- Dynamic High-rank Tensors
- Dynamic Interaction Networks
- Dynamic Neural Networks
- Evolutionary Neural Networks
- Fuzzy Neural Networks
- Graph Convolutional Networks
- Hierarchical Neural Networks
- Long Short-Term Memory Networks
- Multiobjective Network Ensembles
- Neural Turing Machines
- Radial Basis Function Networks
- Recurrent Neural Networks

### *Application Areas:*

- Bankruptcy Prediction
- Central Clearing Counterparty Trading, Clearance and Settlement
- Contagion Modeling and Analysis
- Cryptocurrency Mechanisms
- Cryptography Innovations in Financial Crime Prevention
- Deanonimizing Blockchain Transactions
- Decentralized Autonomous Organizations
- Derivatives Modeling and Pricing
- Fraud Detection
- Ledger Network Analysis and Simulations
- Market Mechanisms Design
- Market Simulation
- Neural Networks Running on Blockchain
- Portfolio Optimization
- Secure Multi-party Calculations on Blockchains
- Smart Contracts
- Stress Tests Modeling
- Systemic Risk Monitoring and Prediction
- Trading Strategies

### IMPORTANT DATES

- 31 December 2018 – deadline for manuscript submission
- 31 March 2019 – reviewers' comments
- 31 May 2019 – submitting revised manuscripts
- 15 July 2019 – final decision to authors
- September 2019 – tentative publication date

### GUEST EDITORS

- *Antoaneta Serguieva*, nChain, London; and LSE Systemic Risk, London, UK.
- *Alexander Lipton*, StrongHold Labs, Chicago; and MIT Connection Science, Cambridge, USA.
- *Nicolas Courtois*, University College London, UK.
- *David Quintana*, Universidad Carlos III de Madrid, Spain.
- *Nikola Kasabov*, Auckland University of Technology, New Zealand.

### SUBMISSION INSTRUCTIONS

- Read the Information for Authors at <http://cis.ieee.org/tnnls>.
- Submit your manuscript at the TNNLS webpage (<http://mc.manuscriptcentral.com/tnnls>) and follow the submission procedure. Please, clearly indicate on the first page of the manuscript and in the cover letter that the manuscript is submitted to this special issue. Send an email to the leading guest editor, *Dr Antoaneta Serguieva* ([cifer@ieee.org](mailto:cifer@ieee.org)), with subject "TNNLS special issue submission" to notify about your submission.
- Early submissions are welcome. We will start the review process as soon as we receive your contributions.