

ICAIF'22 Accepted Workshops

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Graph and Knowledge Graphs in Finance (https://sites.google.com/view/icaifwfs2022/)

Graph representation and knowledge graphs provide unique opportunities in representing complex systems that are challenging to model using tabular data. They effectively represent complex systems with a large number of entities, multiple entity types, different relationship types, and patterns. This provides unique opportunities in using graph and graph-based solutions in financial services, ranging from modeling the financial market's transactional systems to financial crime detection. In addition to the benefits of graph representation, graph native machine-learning solutions such as graph neural networks, convolutional networks, and others have been implemented effectively in many financial systems.

Graph representations allow researchers to model inductive biases, encode domain expertise, combine explicit knowledge with latent semantics, and mine patterns at scale. This facilitates explainability, robustness, transparency, and adaptability—aspects that are all uniquely important to the financial services industry. Recent work on numeracy, tabular data modeling, multimodal reasoning, and differential analysis, increasingly rely on graph-based learning to improve performance and generalizability. Additionally, many financial datasets naturally lend themselves to graph representation—from supply chains and shipping routes to investment networks and business hierarchies.

In recent years, knowledge graphs have shown promise in furthering the capabilities of graph representations and learning techniques with unique opportunities such as reasoning. Reasoning over knowledge graphs enables exciting possibilities in complementing the pattern detection capabilities of the traditional machine learning solutions with interpretability and reasoning potential. This path forward highlights the importance of graphs in the future of AI and machine learning systems.

Organizers: Armineh Nourbakhsh (J.P. Morgan AI Research), Naftali Cohen (Schonfeld and NYU), Eren Kurshan (Bank of America), Bayan Bruss (Capital One), Senthil Kumar (Capital One), Susan Tibbs (FINRA), Nic Seyot (Morgan Stanley), Anisoara Calinescu (University of Oxford)

Explainable AI in Finance

(<https://sites.google.com/view/2022-workshop-explainable-ai/home>)

Explainable AI (XAI) forms an increasingly critical component of operations undertaken within the financial industry, brought about by the growing sophistication of state-of-the-art AI models and the demand that these models be deployed in a safe and understandable manner. The financial setting brings unique challenges to XAI due to the consequential nature of decisions taken on a daily basis. As such, automation within the financial sector is tightly regulated: in the US consumer credit space, the Equal Credit Opportunity Act (ECOA), as implemented by Regulation B, demands that explanations be provided to consumers for any adverse action by a creditor; in the EU, consumers have the right to demand explanations for automated decisions under the General Data Protection Regulation (GDPR). Safe and effective usage of AI within finance is thus contingent on a strong understanding of theoretical and applied XAI. Currently, there is no industry standard consensus on which XAI techniques are appropriate to use within the different parts of the financial industry – or if indeed the current state-of-the-art is sufficient to satisfy the needs of all stakeholders. This workshop aims to bring together academic researchers, industry practitioners and financial experts to discuss the key opportunities and focus areas within XAI – both in general and to face the unique challenges in the financial sector.

Organizers: Francesca Toni (Imperial College London), Saumitra Mishra (J.P. Morgan AI Research), Adrian Weller (University of Cambridge), Andreas Joseph (Bank of England), Xia Ben Hu (Rice University)

Synthetic Data for AI in Finance

(<https://sites.google.com/view/icaif-synthetic/home>)

Synthetic data, that is, artificial data created to mimic real-world data, have recently gained popularity in various applications in the industry such as computer vision, healthcare and finance. In the latter, due to the highly regulated nature of the business, synthetic data is particularly useful. For instance, synthetic data can be more easily shared within and outside firms, as well as provide alternative data to problems where an extreme class imbalance is present, such as fraud detection and money laundering activity detection. However, many questions surrounding synthetic data have yet to be fully answered, including but not limited to privacy leakage in synthetic data generation, fairness implications when using synthetic data, or more fundamentally how one should assess quality and usefulness of synthetic data. We would like to bring together researchers from academia, practitioners from synthetic data providers as well as consumers of synthetic data in financial organizations to understand the evolving landscape around this important topic. This workshop would serve as a venue for cross-pollination between academic research and industry practical experience. Our main goals are to develop an understanding of the most important open problems, current methods and their limitations, and establish a series of cross-disciplinary good practices.

Organizers: Giulia Fanti (CMU), Rachel Cummings (Columbia University), Vyas Sekar (CMU), Tucker Balch (J.P. Morgan AI Research), Samuel Assefa (U.S. Bank), Vamsi K. Potluru (J.P. Morgan AI Research)

Women in AI and Finance

(<https://sites.google.com/view/women-in-ai-finance/home>)

Our goal is to bring together women at the intersection of AI and finance and create a forum where they can share their experience, ideas and vision. We encourage professionals, AI/ML researchers and practitioners across industry and academia to participate in the workshop and advance AI in Finance through collaboration. With the workshop, we aim to improve the visibility of women in AI and Finance, provide an opportunity for networking, and encourage mentorship of junior female researchers in the field. Hopefully, we can all learn from each other's perspectives and make some new connections along the way.

Organizers: Simerjot Kaur (J.P. Morgan AI Research), Charese Smiley (J.P. Morgan AI Research), Zhen Zeng (J.P. Morgan AI Research), Rene Zhang (Fidelity Investments), Laura Simonsen Leal (Goldman Sachs), Anastasia Borovykh (Warwick Business School and Imperial College London)

Small Data, Big Opportunities: Making The Most Of AI

(<https://sites.google.com/view/icaif2022workshop/home>)

To date, much of the impact AI has had in the industry has benefited large internet-scale tech companies for search, recommendations, user-identification and the like. AI has seen less success in the more general day-to-day businesses, such as financial services. Even among large companies, only a small percentage benefit from AI, with 60%-85% of AI projects failing to achieve the return on investment promised during the planning stage. In addition, in the last 2 years, the extreme business changes from the COVID-19 pandemic caused ML and AI models based on large amounts of historical data to become less relevant.

The good news is surprisingly solid and flexible AI systems can be built around a smaller data set. While the narrative for the last 10 years has been mostly about big data, it is not about "big data only" anymore. Taking a small-data approach is a more targeted, tailored way to feed data into an AI model and inject continuous feedback once the model is deployed. One key feature of this approach is to build the tools that allow the experts to codify and engineer the data and information in a way that lets them express the domain knowledge.

In this workshop, we look to bringing together practitioners from industry and academia to discuss approaches and developments of AI capabilities with a small data approaches. We are also particularly interested in exploring best practices in injecting domain knowledge from experts in the AI system.

Organizers: Andrea Stefanucci (J.P. Morgan AI Research), Samuel Assefa (U.S. Bank), Bjorn Austrat (Truist), Sherin Mathews (U.S. Bank)

Machine Learning for Investor Modelling

(<https://sites.google.com/view/mlforinvestormodelling/home>)

Analysis of actual investor behaviours show that decisions made by retail and institutional investors and their advisors are not always consistent with decisions deemed optimal by financial models. These behaviours point to the need for buy and sell side investment dealerships and banks to develop tools that provide automated support for retail investors and financial advisors in selecting, managing, and evaluating investment portfolios. These tools must incorporate Behavioral finance, the study of how investor cognition and social networks affect personal investment and market outcomes. The difficulty in designing these tools lies in the specification of the complex mathematical structure that models investor behavior in the presence of market conditions. Machine learning offers a data-driven approach requiring less specification of the structure of the data generating process. In this workshop, we will explore the modern intersections between behavioural finance and machine learning. We invite academic and industrial specialists in machine learning and quantitative finance. Together with financial industry practitioners and fintech entrepreneurs to share their understanding of to better model investor behaviors, this workshop will guide the next steps in the research path of behavioral finance and machine learning.

Organizers: John R. J. Thompson (University of British Columbia), Dhagash Mehta (Blackrock, Inc.), Matt Davison (Western University Canada)

AI in Africa for Sustainable Economic Development

(<https://sites.google.com/view/aiinafrica2022/home>)

Given the Sustainable Development Goals (SDGs) of African countries, the use of Artificial Intelligence (AI) cannot be overemphasized in various sectors including Finance, Healthcare, Agriculture and Security. There exists massive potential for increased adoption of AI in Africa to boost productivity and economic development. This is however limited by a variety of challenges including the lack of expertise, resources, infrastructure for data collection and most importantly the awareness of the tremendous capabilities of AI in Africa.

The application of AI in the Finance sector has seen much growth over the years prompting significant investments in research in these areas. However, these research efforts have been dominantly led by practices in the developed world that might not fit well given the complexity in African nations. The AIA initiative is backed by a group of AI researchers whose focus is to extend these AI capabilities to the Finance sector and foster collaboration in Africa.

The main theme of the 2022 workshop will focus on the opportunities and challenges of applying AI to address key developmental problems faced in Africa. The panel discussion will be around plausible structure of data ecosystem to enhance the growth of AI in Africa. A lot of research has been impeded by the lack of data which in turn has slowed down the pace of development. Of significance is the 2030 SDG initiative (which defines the metrics for development in African nations) which relies on obtaining data from developing countries in Africa.

Organizers: Toyin Aguda (J.P. Morgan AI Research), Mahmoud Mahfouz (J.P. Morgan AI Research), Girmaw Abebe Tadesse (IBM Research Africa), Elefelious Belay (University of Addis Ababa), Getachew Mengesha (University of Addis Ababa), Babatunde Sawyerr (University of Lagos), Allan Anzagira (J.P. Morgan AI Research)

Benchmarks for AI in Finance

(<https://sites.google.com/view/benchmarks-ai-finance/home>)

Common benchmark problems and datasets have long been a driving force in AI. Shared benchmarks such as ImageNet, CIFAR, MuJoCo, Atari etc. have enabled fair comparison of state of the art algorithms and helped coordinate researchers from around the world to tackle specific problems, measure progress and build on each other's work. The goal of the "Benchmarks for AI in Finance" workshop is to spearhead an effort to create similar benchmarks for the subdiscipline of AI in Finance. The workshop will invite submissions of benchmark datasets and environments for tasks in the financial domain and facilitate the discussion of challenges, opportunities and best practices in creating benchmarks, particularly in a highly regulated industry with proprietary and sensitive data.

Organizers: Sumitra Ganesh (J.P. Morgan AI Research), Joseph Jerome (University of Liverpool), Dhagash Mehta (BlackRock), Eleonora Kreacic (J.P. Morgan AI Research), Christian Schroeder de Witt (University of Oxford), Yang Zhang (Bank of Canada)

Secure and Private Computing in AI and Finance

(<https://sites.google.com/view/spcaif22>)

Financial data are considered as highly critical information as they contain personally identifiable information, which banking, capital markets, and other financial industries deal with and possess as a part of their day-to-day business. Several research directions in security and privacy aim at enabling secure use of computation techniques including Artificial Intelligence and Machine Learning, on this data. The goal of this workshop is to bring together researchers in the areas of privacy/security, finance and artificial intelligence, to discuss existing approaches and future directions, and advance the field as an interdisciplinary community.

Organizers: Sahar Mazloom (J.P. Morgan AI Research), Daniel Escudero (J.P. Morgan AI Research)

Machine Learning for Environmental, Social and Governance (ESG) Investing (<https://sites.google.com/view/ml4esg2022/home>)

Environmental, Social and Governance (ESG) Investing has received a tremendous amount of attention in recent years, with investors and companies increasingly focusing on ESG metrics. With vast amounts of data available to compute such metrics, the use of data science and machine learning (ML) techniques in this context is of ever greater importance. This workshop will be the first of its kind by specifically focusing on ML for ESG. The workshop will appeal to a wide range of audience including investment practitioners, commercial ESG score providers as well as machine learning researchers.

Organizers: Stefan Zohren (Oxford-Man Institute, University of Oxford and Man Group), Brian Bruce (Hillcrest Asset Management), Dhagash Mehta (BlackRock), Steven Reece (University of Oxford)

Natural Language Processing and Network Analysis in Financial Applications (<https://sites.google.com/view/nlp-na-in-finance-2022/home>)

Applications of NLP and network science in finance have received tremendous attention within the last decade. An increasing number of areas from the applied finance community are successfully leveraging and blending tools from NLP, network analysis and graph machine learning, for tasks ranging from asset pricing, portfolio construction, and risk management, to understanding large scale supply chain networks, market crash and fraud detection. This workshop, which is a continuation of last year's workshop at ICAIF'21 with the same title and the same organization committee, aims to illustrate the broad interplay between these techniques and analysis tools in the context of financial applications, showcasing a suite of problems of interest to both researchers and practitioners. The workshop will invite speakers and contributors working on the highly interdisciplinary and active area of research of natural language processing (NLP) and network science for financial applications. In addition to attracting high quality research contributions to the workshop, one of the aims of the workshop is to mobilize the researchers working on the related areas to form a community and to provide a platform to exchange ideas and foster further interdisciplinary research collaborations among researchers.

Organizers: Leman Akoglu (Carnegie Mellon University), Mihai Cucuringu (University of Oxford) , Xiaowen Dong (University of Oxford), Dhagash Mehta (BlackRock, Inc.), Saurabh Nagrecha (eBay), Stefan Zohren (Oxford-Man Institute, University of Oxford and Man Group)

USAIF: User Safety in AI and Finance (<https://sites.google.com/view/usaif22>)

Safety is essential to financial services and consumer confidence in safety is believed to drive the relatively high trust enjoyed by the finance domain. Artificial Intelligence is increasingly leveraged by financial services. This increased use of AI, coupled with the safety and trust challenges in domains with more sustained use of AI, argues for the criticality of understanding safety in the context of AI and finance. Some areas of AI safety research cut across domains but the finance domain adds to the research challenges due to the critical role financial services play in society and variance in end user financial expertise and tool access. In addition, new financial instruments whose complex underlying technology is difficult to understand and may have unexpected privacy/security consequences, lead to novel research challenges. Blockchain-based payments are an important example. They, particularly when paired with AI, offer the democratization of many transactions through decentralization, but are currently hard to undo and are a potential scammer tool. This workshop will delve into many of these challenges and help inform a research roadmap in this area. The agenda will consist of invited talks with ample discussion time, all of which will be summarized in a short white paper following the conclusion of the workshop.

Organizers: Rebecca Fiebrink (University of the Arts London & Artema Labs), Jenny Gove (Google), Markus Jakobsson (Artema Labs), Jessica Staddon (J.P. Morgan AI Research)

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