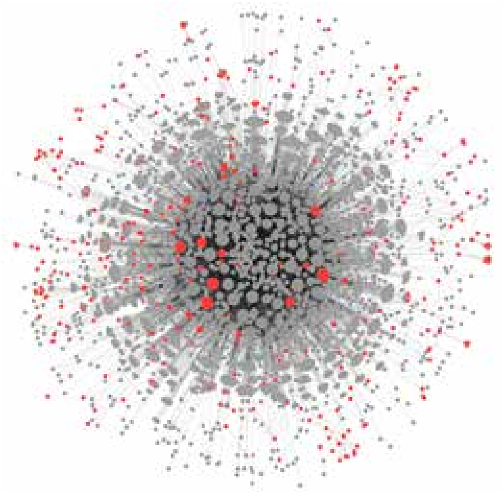
Anti-Money Laundering with Graphs

How to construct and interpret graphs to identify compliance risks and transaction patterns? How to detect clusters of accounts with similar transactional behaviors?

> Understand how accounts and transactions can be visualised by different types of graphs
> How graph data science is used to detect clusters of accounts that exhibit similar behaviours and complex transaction patterns
> Learn how graphs are constructed with various tools and softwares



This course is designed to introduce **compliance professionals** in the finance sector, with diverse backgrounds, to the **fundamentals of graph theory and its practical applications in compliance and regulatory contexts**. The seminar aims to equip participants with the knowledge and skills necessary to identify which graph data science methods and algorithmic tools can be leveraged to address complex compliance challenges.

This course is presented by two complementary experts: **Dr. Dimosthenis Pasadakis, who conducts research on data science and graph theory, and by Dr. Madan Sathe, who is an expert consultant in compliance issues for the financial services in Switzerland** and who will bridge data science and compliance tasks.

Dr. Dimosthenis Pasadakis,
Università della Svizzera italiana (USI) and Panua Technologies, Lugano

Dr. Madan Sathe,
Partner, Forensic, Deloitte AG, Zurich

The role of graphs in compliance

• Overview of graph theory and its relevance in finance and compliance
• Examples of graph data science in banking, compliance, and regulatory frameworks

Graphs play a crucial role in compliance by enabling the visualization and analysis of complex relationships between accounts and transactions. Through graph analysis, compliance professionals can identify potential compliance issues, such as money laundering activities, fraud, and other regulatory breaches, which traditional methods might overlook. This introductory chapter will provide an overview of graph algorithms and their potential application in a compliance context.

Building graphs from financial transactions

• Fundamentals of nodes and edges in financial graphs
• Types of graphs
• Representing accounts and transactions using matrices
• Similarities between accounts

Constructing graphs from financial and compliance data involves identifying the nodes (e.g., accounts, customers) and edges (e.g., transactions, relationships) that define the network. Different types of graphs, such as directed, undirected, weighted, and unweighted, can be used depending on the nature of the relationships. Accurately representing financial data in graph form is a critical step for any subsequent exploration and monitoring activity. This chapter is devoted in presenting the ways that such graphs can be realized.

Ranking and monitoring the importance of accounts

• Centrality measures and their importance in compliance monitoring
• The PageRank algorithm to identify key accounts and potential risk points
• Predicting future transactions and identifying potential compliance risks

Ranking the importance of accounts in a financial network is essential for identifying key players that may pose higher risks, such as central nodes in money laundering schemes or fraud networks. Methods like centrality measures and the PageRank algorithm help in ranking accounts based on their connections and influence within the network. Link prediction models can further analyze these rankings to forecast potential future transactions or risk behaviors, assisting in the prioritization of monitoring efforts.

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Dr. Dimosthenis Pasadakis is a postdoctoral fellow at the Institute of Computing of Università della Svizzera italiana (USI) in Lugano and the Chief Operating Officer of Panua Technologies, a Swiss software company specializing in advanced computational solutions. His research is primarily focused on the development of algorithms for graph learning, combinatorial optimization, graph clustering, and anomaly detection. Dr. Pasadakis's contributions have been recognised with several awards, including Best Poster Presentation at the IEEE SDS and ACM PASC conferences, and Outstanding Short Paper and Outstanding Paper awards at the IEEE HPEC conference. His work aims to bridge theoretical advancements in algorithm design with practical applications in high-performance computing and data analytics, impacting both academic research and industry practices.

Dr. Madan Sathe is a Partner in the Forensic Practice at Deloitte Switzerland. He has over 12 years of experience in investigation and financial crime including extensive data analytics and technology experience. He started his career at EY in Switzerland with a major focus on financial services clients (banking, insurance clients) and the life science industry. During his career he built and lead a forensic data analytics practice and advised major financial services clients in the area of financial crime compliance and investigation around the topics of data, artificial intelligence and technology.

Detecting financial communities and clusters

- Introduction to graph clustering and its applications in compliance
- Latent spectral information of networks
- Metrics for assessing the quality of detected communities
- Case studies and examples demonstrating the identification of suspicious clusters

Detecting communities within financial graphs helps compliance professionals identify clusters of accounts that exhibit similar behaviors or are tightly connected through a series of transactions. Graph clustering techniques can be used to detect such communities, which may indicate organized groups involved in illicit activities. Analyzing these clusters' characteristics, such as size and connectivity, provides insights into the structure and potential risks posed by these groups.

Anti-Money Laundering (AML) with graphs

- Datasets and test cases
- Detecting fraudulent activity
- Graph-based anomaly detection for identifying money laundering schemes

Graphs are powerful tools in Anti-Money Laundering (AML) efforts, as they enable the identification of complex transaction patterns that may indicate money laundering. Techniques such as anomaly and community detection can be employed to flag suspicious activities within financial networks. Visualizing and analyzing these patterns helps compliance professionals better understand the flow of funds and identify attempts to obscure the origins of illicit money.

Tools and software

- Overview of graph analytic libraries and software
- Visualization options

Compliance professionals can utilize various tools and software for graph data analysis. These tools offer functionalities for graph construction, visualization, and analysis, allowing for a more intuitive understanding of complex financial networks. In this chapter we will review algorithmic frameworks that support such capabilities.

Q&A and discussion

- Open floor for questions and discussion of real-world applications.
- Discussing future trends and the evolving role of graph data science in compliance.

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FEE
580 CHF + VAT (8.1%)
Additional participants from the same company: -50%

PAYMENT
An invoice will be sent to you by email following registration. Payment is made by bank transfer or credit card.

AF 1382

I register to the seminar "Anti-Money Laundering with Graphs" on 30 October 2024.

☐ I will attend in the conference room ☐ I will attend online on Zoom.

Full name ....

Position .... Company..........

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