

THE CAPCO INSTITUTE
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OF FINANCIAL TRANSFORMATION

AI

ORGANIZATIONAL

Assessing AI and data protection expertise
in academia and the financial services
sector: Insights and recommendations
for AI skills development

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**ARTIFICIAL
INTELLIGENCE**

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CONTENTS

TECHNOLOGICAL

08 Overview of artificial intelligence deployment options

Ali Hirsa, Professor of Professional Practice, Department of Industrial Engineering and Operations Research, Columbia University, and Chief Scientific Officer, ASK2.AI

Satyan Malhotra, Chief Executive Officer, ASK2.AI

24 Applied generative AI governance: A viable model through control automation

Gerhardt Scriven, Managing Principal

Marcel Braga, Principal Consultant

Diogo Santos, Principal Consultant

Diego Sarai, Managing Principal

34 AI and banks. In conversation with an AI intern

Jesús Lozano Belio, Senior Manager, Digital Regulation, Regulation and Internal Control, BBVA

44 Performance of using machine learning approaches for credit rating prediction: Random forest and boosting algorithms

W. Paul Chiou, Associate Teaching Professor of Finance, Northeastern University

Yuchen Dong, Senior Engineer, MathWorks

Sofia X. Ma, Senior Engineer, MathWorks

54 A smart token model for native digital assets

Ian Hunt, Buy-Side Industry Consultant and Adviser

OPERATIONAL

72 Networked business design in the context of innovative technologies: Digital transformation in financial business ecosystems

Dennis Vetterling, Doctoral candidate, Institute of Information Management, University of St. Gallen

Ulrike Baumöl, Executive Director of Executive Master of Business Administration in Business Engineering, and Senior Lecturer on Business Transformation, University of St. Gallen

82 Developers 3.0: Integration of generative AI in software development

Fayssal Merimi, Managing Principal, Capco

Julien Kokocinski, Partner, Capco

90 Digital transformation and artificial intelligence in organizations

Niran Subramaniam, Associate Professor in Financial Management & Systems, Henley Business School

98 Is accounting keeping pace with digitalization?

Alnoor Bhimani, Professor of Management Accounting and Director of the South Asia Centre, London School of Economics

104 Bank and fintech for transformation of financial services: What to keep and what is changing in the industry

Anna Omarini, Tenured Researcher, Department of Finance, Bocconi University

ORGANIZATIONAL

116 The truth behind artificial intelligence: Illustrated by designing an investment advice solution

Claude Diderich, Managing Director, innovate.d

126 Duty calls – but is industry picking up?

Jessica Taylor, Consultant, Capco

Ivo Vlaev, Professor of Behavioral Science, Warwick Business School

Antony Elliott OBE, Founder, The Fairbanking Foundation

138 Generative artificial intelligence assessed for asset management

Udo Milkau, Digital Counsellor

150 How can banks empower their customers to flag potential vulnerabilities?

Przemek de Skuba, Senior Consultant, Capco

Bianca Gabellini, Consultant, Capco

Jessica Taylor, Consultant, Capco

160 Assessing AI and data protection expertise in academia and the financial services sector: Insights and recommendations for AI skills development

Maria Moloney, Senior Researcher and Consultant, PrivacyEngine, Adjunct Research Fellow, School of Computer Science, University College Dublin

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DEAR READER,

As the financial services industry continues to embrace transformation, advanced artificial intelligence models are already being utilized to drive superior customer experience, provide high-speed data analysis that generates meaningful insights, and to improve efficiency and cost-effectiveness.

Generative AI has made a significant early impact on the financial sector, and there is much more to come. The highly regulated nature of our industry, and the importance of data management mean that the huge potential of AI must be harnessed effectively – and safely. Solutions will need to address existing pain points – from knowledge management to software development and regulatory compliance – while also ensuring institutions can experiment and learn from GenAI.

This edition of the Capco Journal of Financial Transformation examines practical applications of AI across our industry, including banking and fintechs, asset management, investment advice, credit rating, software development and financial ecosystems. Contributions to this edition come from engineers, researchers, scientists, and business executives working at the leading edge of AI, as well as the subject matter experts here at Capco, who are developing innovative AI-powered solutions for our clients.

To realize the full benefits of artificial intelligence, business leaders need to have a robust AI governance model in place, that meets the needs of their organizations while mitigating the risks of new technology to trust, accuracy, fairness, inclusivity, and intellectual property. A new generation of software developers who place AI at the heart of their approach is also emerging. Both GenAI governance and these ‘Developers 3.0’ are examined in this edition.

This year Capco is celebrating its 25th anniversary, and our mission remains as clear today as a quarter century ago: to simplify complexity for our clients, leveraging disruptive thinking to deliver lasting change for our clients and their customers. By showcasing the very best industry expertise, independent thinking and strategic insight, our Journal is our commitment to bold transformation and looking beyond the status quo. I hope you find the latest edition to be timely and informative.

Thank you to all our contributors and readers.

A handwritten signature in black ink, appearing to read 'Lance Levy', with a stylized, flowing script.

Lance Levy, **Capco CEO**

ASSESSING AI AND DATA PROTECTION EXPERTISE IN ACADEMIA AND THE FINANCIAL SERVICES SECTOR: INSIGHTS AND RECOMMENDATIONS FOR AI SKILLS DEVELOPMENT

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ABSTRACT

The proliferation of artificial intelligence (AI) is reshaping modern life in many ways. This has prompted action from many governments globally. The European Union is in the process of drafting a new E.U. AI Act, modeled on GDPR. To navigate this evolving regulatory landscape, financial researchers and industry professionals will need comprehensive training. However, existing efforts seem limited. This paper puts forth the idea of tailored training to better understand the complex interaction of data protection and ethical AI. It uses case studies to highlight the challenges of AI and the GDPR in the financial services sector. We also put forth survey findings that suggest current programs inadequately prepare individuals for GDPR compliance in AI. Recommendations include an initial training framework for ethical and compliant AI engagement.

1. INTRODUCTION

Artificial intelligence (AI) is revolutionizing contemporary life. The European Union (E.U.) acknowledges this progression of AI's central role in modern life and is crafting new regulation entitled the E.U. AI Act, which mirrors in many ways the influential General Data Protection Regulation (GDPR) – both are risk-based approaches to regulation. The financial sector is faced with an increasingly complex regulatory landscape and navigating it necessitates robust education. This paper argues that training efforts for this new landscape remain inadequate, particularly when faced with the existing GDPR, the forthcoming AI Act, and the expanding domain of AI ethics.

This paper underscores the need for targeted training through case studies, focusing on GDPR-compliant AI applications in the financial sector. A 2023 survey of financial experts and AI researchers investigates GDPR awareness and familiarity with Explainable AI (xAI). GDPR mandates transparency and accountability in AI decisions, achievable through xAI – an emerging field creating transparent AI models. GDPR-compliant xAI necessitates the fusion of not only GDPR principles into xAI development, but also interdisciplinary collaboration and transparent methods throughout the development lifecycle. The results of our survey indicate existing programs may not sufficiently prepare individuals in academia and industry for GDPR-compliant AI.

In conclusion, we offer an initial training framework to prepare academics and industry practitioners for ethical and compliant AI engagement, bridging the knowledge gap and ensuring GDPR compliance.

2. AI AND E.U. CITIZENS: THE WIDER PICTURE

Europe's approach to AI centers on promoting quality and trust while preserving human rights. Regulations like the E.U. Cybersecurity Strategy, Digital Services Act, Digital Markets Act, and Data Governance Act all contribute towards establishing a foundation for ensuring data quality. The Digital Europe Programme aims to bolster digital skills through education and training, addressing the gender gap, and fostering industry partnerships.

Convention 108+¹ and the GDPR are two of the leading canons for data protection in the digital age. To a degree, they both emphasize the importance of safeguarding personal data in AI applications. The AI Act, modeled on the GDPR, goes further in emphasizing data governance standards to prevent harmful biases in AI.

Concerns arise, however, regarding limited human oversight in AI-first business models that are particularly prevalent in the fintech sector. These business models aim to reduce costs by mitigating, or eliminating, human oversight and intervention. Recognizing this trend, the AI Act places stringent requirements on data used to train AI algorithms, emphasizing fairness and transparency, especially when personal data and special category data is used to train the algorithms.

The recent Dutch Child Benefit scandal exposed the potential harm of unchecked AI² use for financial matters. This case emphasizes the importance of balancing societal needs with the developmental advances of AI. GDPR compliance among fintech firms remains crucial. In fact, this supports the necessity for education and training. Horizon Europe, with a €95.5 billion budget, is prioritizing AI research and development, while aligning with the digital and green transition.

Questions linger regarding the extent to which the AI Act addresses prioritizing AI and data protection training across Europe and how rigorously the GDPR enforces transparency and accountability in AI technology. Further developments are

needed to ensure responsible AI adoption and data protection.

2.1 GDPR and explainable AI (xAI)

Fintech companies are increasingly adopting AI technologies, with 75% expected to do so according to Gartner.³ Ensuring GDPR compliance is vital in this context, as it requires organizations to provide a right to explanation when an automated decision is made about individuals. The European Parliament recognizes the GDPR's right to explanation as challenging for AI systems and believes that transparent AI decision-making processes could be achievable through the use of Explainable AI (xAI) methods.

The International Association of Privacy Professionals⁴ asserts that xAI is pivotal for GDPR compliance. It aids individuals in understanding data usage and decision-making processes, reducing algorithmic bias risks in fintech. They emphasize the GDPR's right to explanation for building consumer trust and ethical AI use.

Financial research underscores xAI's role in enhancing transparency, decision accuracy, and customer trust in financial models. Challenges include data complexity, quality, and specialized knowledge.

Financial frameworks have in recent years advocated for GDPR-compliant xAI systems, emphasizing data protection and user rights. Compliance can mitigate legal liability and promote transparency, accountability, and data protection.

In conclusion, GDPR-compliant xAI is pivotal for responsible and ethical AI integration in fintech. It fosters consumer trust, minimizes risks, and drives AI-based innovation while ensuring GDPR adherence. As AI advances, embracing GDPR principles through xAI implementation remains essential.

2.2 Training on GDPR and AI Act in finance and academia: State-of-the-art

GDPR mandates significant changes in financial organizations regarding personal data management, encompassing secure archiving, transaction records, data processing, and customer rights. However, a Versasec survey⁵ revealed that 27% of companies find educating internal employees challenging, and Deloitte noted a gap in data protection understanding

¹ <https://tinyurl.com/3uxw476j>

² <https://tinyurl.com/342kaekj>

³ <https://tinyurl.com/yaah3ykf>

⁴ <https://tinyurl.com/y8nvr6r8>

⁵ <https://tinyurl.com/yju8fwj4>

between specialists and customer-facing staff.⁶ Financial institutions have well-established training programs, adapted and expanded for GDPR, resulting in high compliance. Yet, AI specialists' GDPR training within finance remains unclear; for example, a German survey from the Center for Financial Studies in 2023 found that while 83% of respondents consider AI regulation necessary, details on the AI Act training are absent.⁷

In academia, Kenny (2021) found 71% of teachers and lecturers in Irish tertiary education participated in GDPR training, showing interest in additional training. However, GDPR awareness among academics in AI research remains underexplored, posing a research gap. Efforts to support GDPR education in academia should be considered, aligning with industry demands for AI-related GDPR compliance and ethical practices.

3. THE SURVEY

The prior discussion highlights the importance of financial experts' and academics' understanding of AI regulations and ethics. We conducted a survey in the winter of 2022/2023 to assess their current level of knowledge in this area.

3.1 Methodology

We conducted a survey with 89 participants, which consisted of AI users and developers in both academia and industry, particularly in fintech and finance. Respondents from 23 countries participated, mainly from, but not limited to, Europe. The average age of the respondents was 43, and 48% were female. The study employs various research designs, including comparisons between researchers and industry experts in AI expertise. We conducted a between-groups design to test the statistically significant difference in the perceived level of expertise in AI between researchers and industry experts. Building upon this result, we then sought to

search for statistically significant associations. Due to sparse data and small sample sizes, we use Fisher's exact test based on $N = 5e8$ Monte Carlo simulations, which is employed when dealing with sparse data or small sample sizes to assess associations between variables, offering a more accurate assessment than the chi-square test in such cases.

3.2 Results

Results revealed a significant difference in perceived AI expertise between researchers and industry experts ($t = -3.6565$, $df = 60$, $p < 0.01$, two-tailed). Industry experts had higher perceived expertise levels (mean = 77.92, SD = 20.45) than researchers (mean = 49.52, SD = 24.92), supporting the idea that academics' perceived level of expertise in AI has an association with their level of knowledge of explainable AI (xAI) and their level of engagement with AI.

There was a significant relationship between knowledge of xAI and frequency of research into AI ($p = 0.0738$). Those conducting AI research as their primary area were more likely to know xAI principles (Table 1). xAI principles, emphasizing transparency and interpretability, equip academics to navigate AI complexities effectively. This understanding enables them to scrutinize AI ethics, biases, and societal impacts, vital aspects of scholarly AI inquiry.

Table 2 is a frequency table that shows responses in percentages as to whether respondents or their employers have ever suffered a data breach. The respondents are categorized according to whether they believe they have knowledge of the GDPR legislation or not.

Remarkably, a majority of respondents, regardless of their GDPR knowledge, claimed that they had never experienced data breaches, even those who considered themselves well-versed in GDPR. This pattern extended to their employers, with 60% of researchers and 89% of industry experts,

Table 1: Cross-tabulation of knowledge of xAI principles by the research conducted

KNOWLEDGE OF XAI	No	2	1	5	6	2
	Yes	7	10	5	12	0
		Secondary research area	Main research area	Rarely	Sometimes	Never

⁶ <https://tinyurl.com/y9fefks5>

⁷ <https://tinyurl.com/ycany3m3>

Table 2: Frequency table of data breaches among respondents with and without knowledge of the GDPR legislation

		ACADEMIA		INDUSTRY	
		Yes	No	Yes	No
Knowledge of the GDPR legislation	Personal data breach victim	40%	60%	20%	80%
	Employer is a data breach victim	40%	60%	11%	89%
No knowledge of the GDPR legislation	Personal data breach victim	29%	71%	0%	100%
	Employer is a data breach victim	0%	100%	0%	100%

knowledgeable of the GDPR legislation, believing their organizations had never experienced a data breach.

Curiously, those who admitted to lacking GDPR knowledge reported no personal (71% of researchers and 100% of industry experts) or employer-related data breaches (100% for both). This contrasts with recent findings, such as the IDC cloud security survey revealing that 98% of companies faced cloud data breaches in the past 18 months⁸ and the Egress' Insider Data Breach Survey 2021, which disclosed that 94% of organizations experienced insider data breaches.⁹

These discrepancies underscore the need for enhanced training and awareness of data security measures. Bridging this knowledge gap through targeted programs in academia and industry is crucial. Such initiatives can equip individuals and organizations with the skills to protect sensitive data effectively. Inadequate GDPR understanding may lead to inadequate, yet vital data protection measures, increasing

the risk of data breaches and regulatory repercussions. Comprehensively addressing this gap is essential to fortifying data security, benefiting both academic and industry stakeholders.

Table 3 summarizes our survey results, emphasizing the relationship between training, expertise, and data protection practices among academics and industry professionals.

The survey revealed a significant difference in perceived AI expertise between academics and industry professionals, with the latter showing higher perceived expertise. Surprisingly, most in both groups who admitted to lacking GDPR knowledge received general data protection training (71% in academia, 75% in industry) but lacked data protection training specifically for AI (ranging from 0% to 25%). This is concerning since both groups develop AI models in their roles (33% for both according to Figure 1).

The difference in AI expertise between academics and

Table 3: Frequency table of received form of training among respondents with and without knowledge of the GDPR legislation

		ACADEMIA	INDUSTRY
With knowledge of the GDPR legislation	GDPR general training	37%	54%
	GDPR training for AI use	2%	6%
	GDPR training for AI development	0%	0%
	GDPR training for fintech	2%	14%
	No GDPR training	58%	43%
Without knowledge of the GDPR legislation	Data protection general training	71%	75%
	Data protection training for AI use	0%	25%
	Data protection training for AI development	0%	0%
	Data protection training for fintech	43%	25%

Note: In certain questions, respondents were permitted to select multiple responses, allowing for the possibility of more than one option being chosen for each question.

⁸ <https://tinyurl.com/3uw6smhm>

⁹ <https://tinyurl.com/fnz8ysyu>

industry professionals may stem from a lack of specialized GDPR/AI training programs. Academics often focus on niche research areas, while industry experts require broader AI knowledge. Our findings also highlight the association between researchers knowledgeable about xAI principles and their primary focus on AI research. This underscores the importance of specialized education in cutting-edge AI concepts. Currently, AI developers lack awareness of Privacy by Design and data protection, as revealed by the survey. The AI Act mandates training to minimize erroneous or biased AI-assisted decisions in critical domains. While universities are beginning to offer data protection postgraduate education, the integration of AI-specific training, particularly emphasizing data protection and ethics, remains crucial for safeguarding individual rights under the GDPR.

The next section outlines two use cases where training, with an emphasis on data protection and ethics, in AI specific challenges, is required to ensure the rights and freedoms of individuals regarding their personal information under the GDPR are to be protected and maintained into the future.

4. TWO EXAMPLES TO ILLUSTRATE THE NEED FOR TRAINING IN THE FINANCE SECTOR

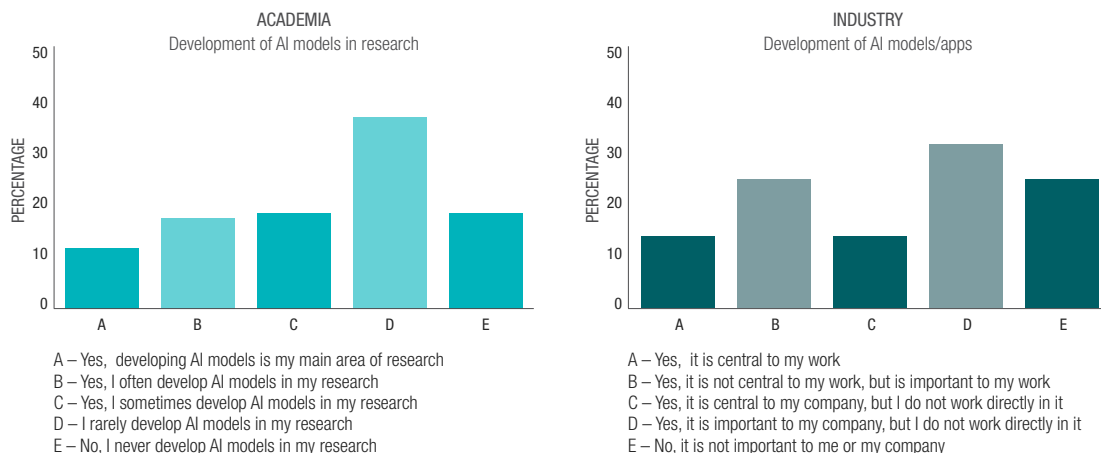
Let us look at two examples that illustrate the challenges of AI deployment in finance: AI informed algorithmic lending and AI-based management of clients’ wealth. These examples serve to clarify relevant training needs for professionals in the financial services and fintech industries.

4.1 Example 1: AI informed algorithmic lending systems

Training of financial services’ practitioners in algorithmic lending should not only include evidence of the prevalence of the use case but also its perilous nature. Such training further needs to span guardrails that can inform ethical algorithmic lending. As training of financial services personnel is imperative in the context of algorithmic lending, we use it to illustrate a stylized training program. Such a training program should pertain to the prevalence, peril, and the potential of algorithmic lending.

- Prevalence of AI-informed algorithmic lending:** Interest in AI-informed algorithmic lending is widespread in financial services. It is highlighted, for instance, as a prevalent use case in surveys of financial services practitioners¹⁰ and in industry¹¹ and regulator position papers.¹²
- Peril of AI-informed algorithmic lending:** In the E.U.’s AI Act, algorithmic lending falls under the high-risk category in financial services. This designation stems from its potential to perpetuate and worsen unjust discrimination, leading to increased disparities in income and social status. This discrimination occurs when lending practices disproportionately affect minority “special category” borrowers, regardless of their creditworthiness. It can happen due to inadequate representation of minority borrower data, inclusion of variables correlated with sensitive minority classes (such as applicant’s geographical location or job profile), and biased historical

Figure 1: Distribution of respondents developing AI models



¹⁰ <https://tinyurl.com/yfhcxr87>

¹¹ <https://tinyurl.com/7exw686w>

¹² <https://tinyurl.com/yh2xta3c>

loan officer decisions present in the training data. AI-driven lending, without properly trained financial personnel, is likely to result in unacceptable discrimination. This can severely impact individuals' rights and freedoms, making it crucial to address these issues in regulatory frameworks.

- **Potential of AI-informed ethical algorithmic lending:** Training is required in how to record, safeguard, and use sensitive data in the pre-, in-, and post-processing stages of algorithmic lending.

4.2 Example 2: AI-based decision making in the management of client's money

AI algorithms have been increasingly used in the investment industry to enhance the investment process and attract clients. In 2017, Tyndaris SAM, a hedge fund based in Monaco, entered into an agreement with the famous tycoon Samathur Li Kinkan (represented by an investment vehicle VWM Limited) to manage his account using an artificial intelligence system called the K1 supercomputer. Li was promised by Tyndaris' CEO that this AI system had the capability to apply machine learning to process social media data and real-time news to predict investor sentiment in the financial markets and, based on this, the movements of U.S. stock futures; the program would then independently send instructions to a broker to execute trades, adjusting its strategy over time based on what it had learned. Although the strategy had been allegedly extensively back-tested and live-tested before trading began, VWM experienced substantial losses, including a U.S.\$20 million loss on February 14, 2018. VWM terminated the contract and sued Tyndaris and its CEO for misrepresenting the K1 supercomputer's capabilities.¹³

Leaving legal issues aside, the case highlights the necessity for training of the involved employees at Tyndaris. First of all, investment professionals should be able to properly classify algorithms in use into one of four risk categories in accordance with the E.U. AI Act. Secondly, as the described situation implies the "human-on-the-loop" constellation (when AI users do not intervene into decisions of algorithms), responsible asset managers should be trained in how to efficiently exercise human oversight in such contexts and stay compliant with the regulation. Are there more specific requirements for data collection, data cleaning, and programming? Or, are more specific measures required for assessing outputs of AI decisions and trades? Thirdly, possible approaches to solving the problem of accountability and responsibility might also be

a part of the training. Finally, sales representatives should be specifically trained to adequately communicate AI capabilities with respect to investments as well as its limitations to clients. They should be able to explain the workings of the algorithm at a very general level in a manner accessible to the lay investor. This also requires specific training.

5. STEPS TOWARDS BETTER TRAINING IN GDPR, THE AI ACT, AND AI ETHICS

Having analyzed and discussed the survey evidence and the illustrative case studies, we now turn to provide a detailed overview of possible steps towards improved training in GDPR, the AI Act, and AI ethics.

A valuable document of which we avail to flesh out such training steps is a report on "AI ethics, training and awareness raising" from the E.U. SIENNA Project.¹⁴ The report differentiates between training in academia and industry. It particularly highlights the value of education in AI issues based on paradigmatic, real-world cases that have raised ethical concerns with respect to AI in society. In part inspired by this recommendation, we have presented two such cases above (algorithmic lending and AI in wealth management). As exemplified by the cases we presented, the inclusion of a case-based component in training programs is important because the cases help to illustrate the importance – and elusiveness – of many AI-related ethical issues (such as privacy, transparency, explainability, accountability, etc.) and the tensions that inevitably arise when professionals try to implement ethical principles in practice. We will now sketch out several steps to inform training programs for finance professionals regarding our two use case examples in AI in financial services, and, more generally, for students and researchers in an educational setting.

5.1 Training steps in algorithmic lending

In the case of algorithmic lending, the focus of training might be on data. Financial services personnel need to be informed about specific obligations for the processing of special category data (e.g., on race, religion, or sexual orientation). It is a difficult area due to a conflict between the right to privacy of individuals and the need to mitigate impermissible discrimination, which requires that special category data of individuals are disclosed and analyzed. In the same vein, a non-discrimination audit of AI-informed lending can prove challenging due to a tension between the rights of individuals

¹³ <https://tinyurl.com/c4hahrk>

¹⁴ <https://tinyurl.com/38u7mhe2>

to both privacy (e.g., Article 7 of the Charter of Fundamental Rights of the European Union 2000; data protection law) and non-discrimination (e.g., Article 21 of the Charter of Fundamental Rights of the European Union 2000 and the Racial Equality Directive).

Indeed, the legal basis for permitting financial institutions to process special category data subject to specified obligations under the GDPR, can be argued, is unclear. Van Bekkum and Zuiderveen Borgesius¹⁵ elaborate, for instance, that GDPR can hinder the collection or use of sensitive personal data to mitigate discrimination while other research papers conclude to the contrary that non-discrimination audits can be compliant. In time, safeguards for a lawful non-discrimination audit are likely to be informed in the finalized AI Act and by case decisions in national and European courts. Meanwhile, some dedicated training sessions could thematize this tension using case studies.

A training program, in the algorithmic lending setting, can differentiate between pre-, in- and post-processing of data. At the stage of data pre-processing before algorithmic model fitting, training is potentially required in the transforming of input data to achieve fairness. The probability of a minority borrower who repays a loan can be increased and a fair training dataset can be resampled. An algorithmic lending model can then be trained on the resampled data, which has ascribed less, or no, sensitivity to the minority class of borrower.

In-processing of data during algorithmic model fitting would require training on how to add a fairness-oriented regularization term to the model to penalize the model for impermissible discrimination. In case of post-processing of data after algorithmic model fitting, training is potentially required in how best to reassign labels (loan granted/ declined) to applicants where there is most uncertainty in the model prediction. This should be implemented to the advantage of

the minority borrowing class, to achieve fairness in lending.

5.2 Training steps in investment management

The Tyndaris case underscores the urgency of training investment professionals in compliance with the E.U. AI Act. Proper classification of algorithms into risk categories is crucial, demanding training to understand this process and its implications. In situations like “human-on-the-loop”, responsible managers need training in effective human oversight to comply with regulations. Specific training is essential for data collection, cleaning, programming, and assessing AI outputs. Asset managers must communicate AI capabilities transparently, utilizing xAI to cater to diverse investor needs. Training should address accountability, transparency levels, and policies, especially for sales representatives explaining algorithms to clients. Specialized training is vital for ensuring data integrity, privacy, and adherence to ethical frameworks like the CFA Institute’s guidelines. These training programs should cover topics ranging from risk classification and human oversight to transparent communication and data privacy, aligning with regulatory requirements and ethical standards.

5.3 Training steps in an academic setting

Academic training for researchers and students must cover data protection, accountability, transparency, and interpretability. Utilizing explainable AI (xAI) in education enhances comprehension of financial concepts and decision-making processes. These findings indicate that xAI significantly improves learning outcomes in fintech education, promoting transparency and understanding in complex financial contexts. By incorporating xAI, academia prepares future financial professionals to adeptly navigate data-driven challenges and utilize ethical AI systems, fostering a responsible and knowledgeable industry workforce.

¹⁵ <https://tinyurl.com/3ujcfmy9>

6. CONCLUSION

The observed disparity in perceived AI expertise between academics and industry professionals, with academics appearing to exhibit a lower perceived level of expertise compared to their industry counterparts, may be attributed to several underlying factors. This phenomenon can be explained through the lens of specialization versus generalization, highlighting that academics often possess a deeper understanding of specific AI-related subjects, while industry experts tend to have a broader, more generalized comprehension spanning multiple domains. This discrepancy underscores the intricate dynamics within the AI ecosystem and the distinct roles played by academics and industry professionals in its advancement.

Firstly, academics are typically engaged in research and teaching roles within academic institutions. They dedicate substantial time and effort to delving deeply into specialized AI topics, contributing to the development of foundational knowledge and the exploration of cutting-edge research areas. This focused approach may result in a perception of lower overall AI expertise when compared to industry experts because their expertise is concentrated within narrower niches.

Conversely, industry professionals, in their diverse roles, often require a more generalized understanding of AI concepts. They apply AI technologies across various applications,

necessitating a broader comprehension that spans multiple domains, including business, technology, ethics, and compliance. Their perceived higher level of expertise may stem from this adaptability and versatility in applying AI solutions to real-world challenges.

Furthermore, it is essential to consider the evolving landscape of AI research and development. While industry professionals may be seen as having a more immediate, practical understanding due to their hands-on experience, academics play a crucial role in advancing the field through foundational research and innovative ideas. The case studies and the described pre-, in-, and post- data processing training steps outlined in this work suggest that academia serves as a fertile ground for exploring and conceptualizing new AI training methodologies and strategies. This research contributes to shaping the future of AI, even though it may not always align with immediate industry practices.

In conclusion, the perceived difference in AI expertise between academics and industry professionals can be attributed to the specialized focus of academics and the broader, practical orientation of industry experts. Recognizing the complementary roles played by these two groups is pivotal in understanding the dynamics of AI knowledge dissemination and advancement. Research conducted within academia, while possibly contributing to the perception of lower overall expertise, nonetheless holds immense value in shaping the future of AI training and development.

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