Ethical Questions of The Use of Artificial Intelligence in Financial Services

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CONTENT

1. INTRODUCTION

Artificial intelligence (AI) is already playing a significant role in the financial sector. While start-ups initially focused on the topic, it is now penetrating further and further into the world of traditional financial service providers. Especially for credit decisions and fraud detection, more and more systems based on supervised and unsupervised learning are being used. While in supervised learning target values are set (e.g., manually determined scores in scoring), in unsupervised learning the system does not know what to look for. Such methods are used, for example, in cybersecurity and fraud detection, where the fraud pattern is not known in advance. Instead, the system searches for abnormal patterns.

The increasing use of AI is driven in particular by digitalization and the customer demand for personalized financial services and decisions in real-time. Also, there are new services that are only made possible by AI, e.g., when large amounts of data are involved ("Big Data"), which must be analyzed in real-time in order to provide services.

When we talk about AI here, we mean artificial-intelligent behavior in relation to the specific task, and not a general artificial intelligence that can make intelligent decisions beyond the learned task.

The association AIinFS e.V. ("Artificial Intelligence in Financial Services"), based in Frankfurt, pools the knowledge of start-ups, universities and traditional companies in the financial sector and aims to further promote the topic of AI through events and publications.

Users of AI-based financial services can be both individuals and companies. While companies primarily want to reduce their costs through such services, convenience, and lack of financial knowledge also play an important role for private individuals. Many people only want to deal with their finances if it is unavoidable, and certainly not with complex issues such as investment, insurance, or retirement planning.

An AI-based service (e.g. as an app) that relieves them of these unloved activities or at least automates them to a large extent can satisfy the desire for convenience.

2. TECHNOLOGY

For the financial sector, the following two leading AI technologies play a role:
1. Machine learning (ML)
2. Natural language processing (NLP)

That was the result of a 2018 Deloitte survey[2] of 206 US financial services companies, in which 70% of the companies stated that they used machine learning and 60% computer linguistics.

For machine learning, there is a whole range of tools that are usually already integrated into the familiar cloud offerings. Here are a few examples:
- TensorFlow (formerly owned by Google)
- Cloud AutoML (Google)
- Watson Studio (IBM)
- SageMaker (Amazon)
- Analytics Cloud (SAP)

The same applies, albeit to a lesser extent, to machine-reading and speech comprehension.

These tools allow companies to develop AI-based services without a great deal of specialist machine learning knowledge.

Behind these tools are various statistical methods as well as Neural networks. If the neural networks have a higher number of layers, this is also called Deep learning.

Most of the solutions thus generated are so-called "Black boxes." They calculate an output for a particular set of input parameters. Still, it is not apparent to outsiders and sometimes also to the owners of the method how this happens exactly. In particular, the correct functioning of the procedure can only be verified by tests. That opens up possibilities for manipulation, in particular through the skillful selection of training data.

That is in contrast to the still relatively young approach of Explainable AI (XAI), where it is possible to understand how the procedure works.

3. APPLICATIONS

What should be achieved with AI in this field / what is the intention of AI in this field?
1. Automated ("multichannel") customer interface
2. Automated investment ("Robo Advisor")
3. Personal Finance Management

4. Predicting market movements
5. Optimized liquidity planning / Factoring
6. Rating and scoring
7. Automated fraud detection
8. Forecast of risks

German examples:
- Catana Capital, Frankfurt (AI-based asset management)
- Scorable, Berlin (Risk prediction of securities)
- Firamis, Frankfurt (Intelligent risk management of investments)
- collectAI, Hamburg (AI-based management of account receivables)
- Risk Ident, Hamburg (Automated fraud detection)
- Fraugster, Berlin (Automated fraud detection)
- e-bot7, Munich (Chatbot)

International examples:
- Alpaca, Japan (Forecast of the exchange rate development in FX trading)
- Ayasdi, USA (Detection of money laundering)
- Alphasense, USA (Recognition of trends through automatic text analysis)
- Kasisto, USA (Chatbot)

What are the target groups, and what are their interests?
1. Private persons:
   more success in investing, convenience, personalized offers, use of new financial services, new communication channels with financial service providers
2. Companies:
   Cost reduction through process optimization, better risk management, due diligence for company takeovers
3. Finance service provider:
   Cost reduction by reducing fraud and misuse (e.g., in payment transactions), a better basis for decision-making (e.g., in granting loans), better management of risks, additional revenues by optimizing digital marketing
4. Regulatory authorities:
   better insight into the risks of financial companies and markets

4. ADVANTAGES

In addition to the cost savings of the different target groups, the use of AI in the financial sector - if used correctly - allows the quality of financial services for private individuals and companies to be improved.

Companies can make important financial management decisions on the basis of more informed forecasts and thus probably faster and better. Private individuals are relieved of tasks that tend to be a burden for them and can achieve excellent results even with little financial knowledge.

Roland Berger[3] provided an example scenario in its 2019 study:

Danny and Lisa — Danny and Lisa, a young couple living in a village, want to buy a new car. But they don't want to spend too much time comparing different financing and insurance options. So they ask their personal AI bot JENI to do this.

CORE INTERACTION — **Personal AI bot JENI** — From now on, the core interaction takes place between JENI and selected companies' AI bots – Danny and Lisa are not involved in any requests, analysis or negotiations. JENI has autonomous problem solving skills, combined with deep insights into the couple's preferences, life circumstances, future plans, financial situation, risk appetite and other relevant data.

Companies' AI bots — Based on this, JENI evaluates various offers that fit Danny and Lisa's criteria – to sell their current car, buy a new one and find different financing and insurance options. Danny and Lisa can at any time ask their personal AI bot for more detailed information or alternatives.

Bank — **Car dealer** — **Insurer** — After just a few hours, JENI has sold the old car and presents a shortlist of up to three packages consisting of a new car with financing and insurance options. Using the couple's digital signature, JENI buys the new car and completes the financing and insurance transactions.
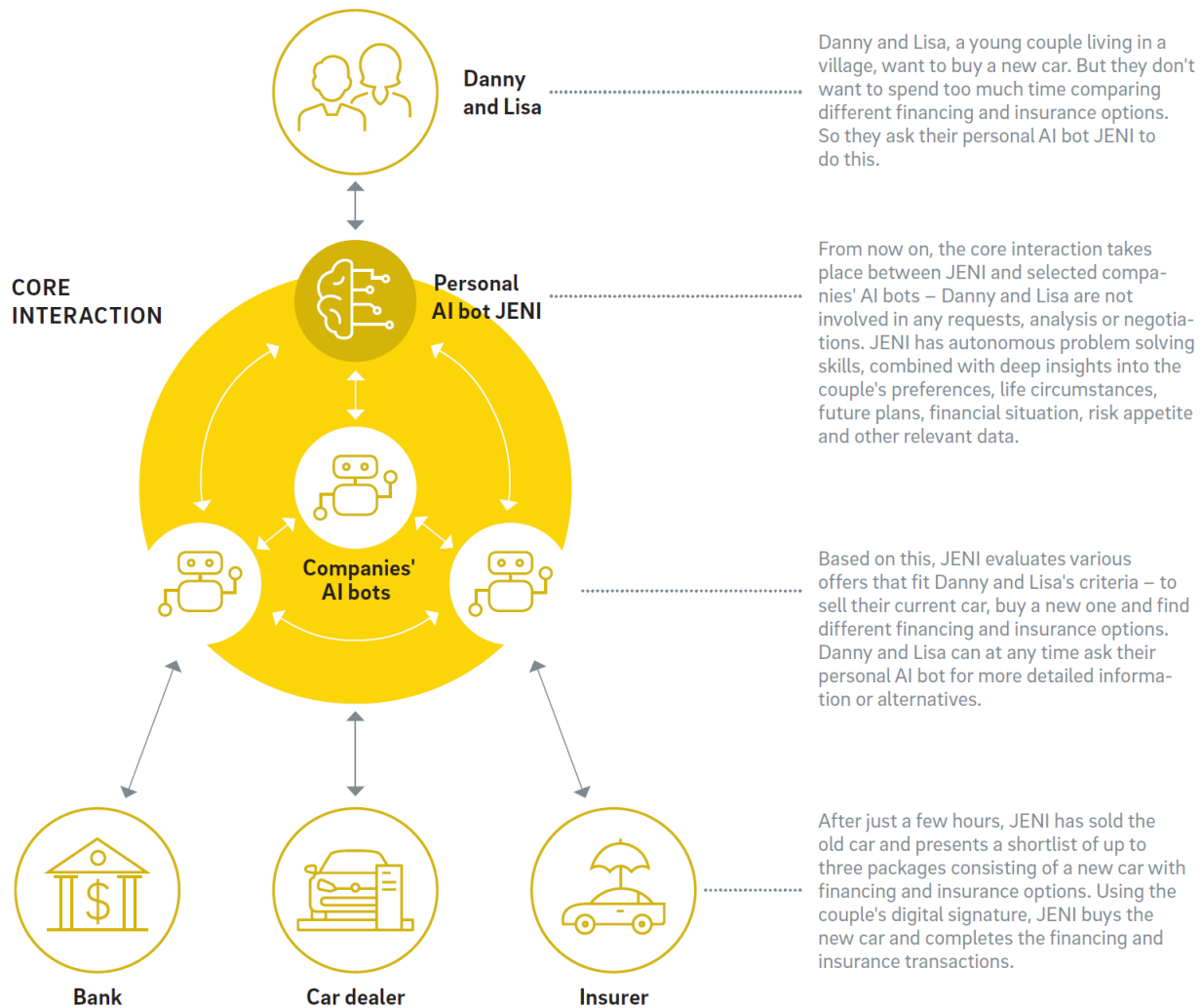
Figure 1: How AI can improve financing and insurance offers (Roland Berger, 2019)

In this example, the question naturally arises as to who owns the KI bot "JENI" and who will profit most from the optimization in the end.

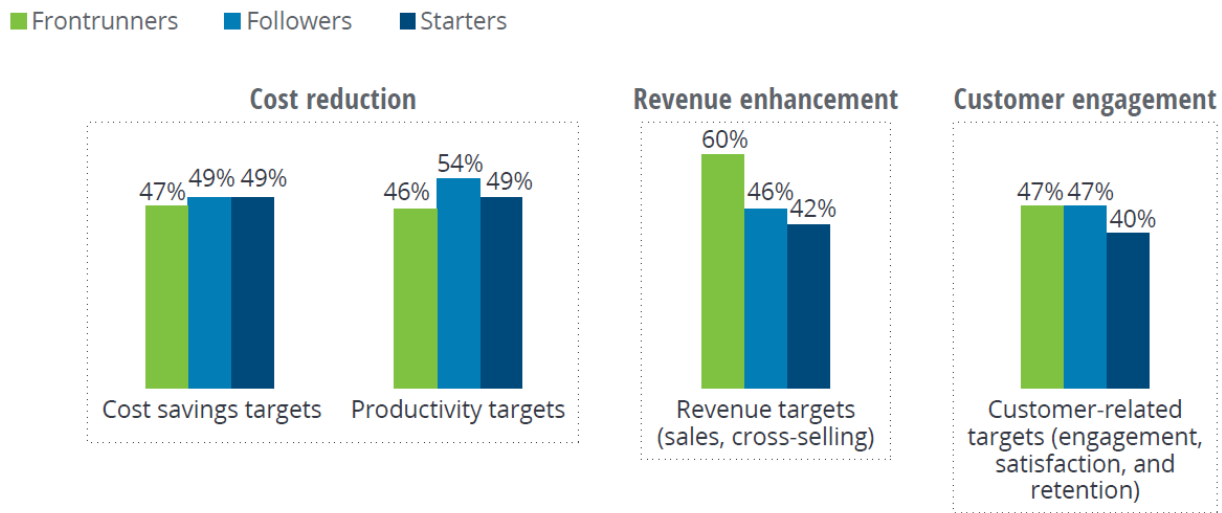For financial companies, Deloitte[2] sees the following advantages:

Figure 2: Reasons for using AI in 206 US financial services companies (Deloitte, 2018)

Deloitte distinguishes between so-called frontrunners, followers, and starters, each of which differ significantly in the strategic assessment of the use of AI and investments in AI procedures.

While all three groups expect cost savings and stronger customer loyalty, the frontrunners also expect an increase in revenue.

In terms of customers, this means that they demand new AI-based financial services, make greater use of existing financial services due to the upgrading with AI, or are prepared to pay a higher price for AI-based services.
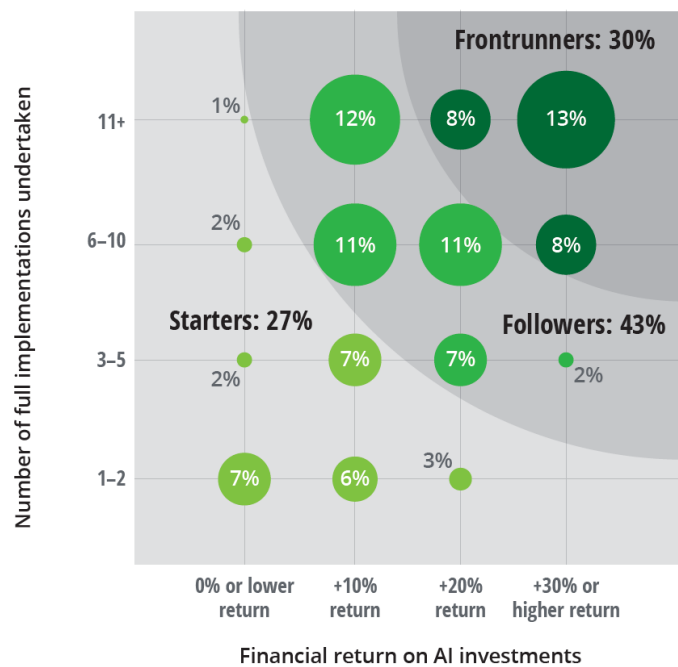

Figure 3: Respondent segmentation based on AI implementations and track record (Deloitte, 2018)

5. RISKS

Risks lie first and foremost in the qualification and experience of the developers of such solutions. Experts in this field are in high demand, and less qualified people may misuse the solutions or raise false expectations about the quality of the predictions.

Data quality is also crucial. If the training data is incorrect, insufficient, not broad enough (covering all possible application situations), unevenly distributed, or otherwise somehow limited, this can have a significant impact on the quality of the results. For example, if the data of a self-employed person is entered into a credit scoring AI trained entirely or almost exclusively with data from employees, the result may or even quite probably be inaccurate or incorrect.

Zetzsche, Arner et al. [4] also identify three regulatory challenges for AI procedures in the financial sector:
1. increasing information asymmetries concerning the possibilities and effects of procedures between users, developers, regulators, and consumers
2. reinforcing the dependence on data, whereby the data of another day can already change the results of the procedure;
3. increasing interdependencies of different systems interacting with possibly unexpected consequences and making it difficult to trace the result

They stress that even for supervisors with unlimited resources and expertise, regulating these AI procedures is likely to be very difficult.

From the financial services provider's point of view, the authors of the Oliver Wyman study "Artificial Intelligence Applications in Financial Services" [1] formulate the following, very justified questions to the board of directors:

- What is the company's AI footprint?
- Does the board have any oversight of the company's use of AI?
- If yes, what is the specific expertise that will enable the board to oversee the use of AI?
- How does the board oversee the use of AI? What are the related documents that the board reviews? What questions does the board pose to the management team?
- Does the company have a set of AI governance principles? If so, how are these implemented? How does the board assure itself that these principles are fit for purpose and actually implemented?
- Does the board have the appropriate skills and expertise to oversee the risks and opportunities arising from AI? If not, does it at least have access to such skills and expertise?
- Does the company engage with policymakers and other relevant stakeholders on AI governance?

Consequently, the use of AI procedures by financial service providers is likely to be not only a regulatory issue but also a question of good corporate governance, with corresponding consequences for the executive board.

6. ETHICAL CONSIDERATIONS

In their work, Zetzsche, Arner et al. [4] underline the importance of ethical considerations in the financial industry in general, especially in the light of the 2008 financial crisis and a whole series of scandals, e.g., LIBOR.

Concerning the use of AI, they emphasize, among other things, the importance of the following three areas:

1. AI as non-ethical actor:
    Algorithms do not "feel" and have no values. They can only assess something like reputation risks by taking a detour via people. And can they foresee possible immoral behavior of people?
2. AI's influence on humans:
    People may react differently when they receive decision-relevant information from an algorithm instead of from another person. In general, AI can improve people's decisions, but it can also worsen them. On the one hand, we might want a human to back up the AI's decision in the end (and not execute it automatically), but on the other hand, isn't the interaction of the AI with the human a source of error?
3. Artificial stupidity and artificial maleficence:
    How can we protect ourselves from errors, incorrect programming, incorrect data, or influences that could not be foreseen when creating the AI? The AI can learn and make decisions that we might consider immoral or malicious, e.g., excluding entire customer groups from financial services.

They see the application of the five OECD AI Principles as a possible approach to solving these ethical questions:

1. AI should benefit people and the planet by driving inclusive growth, sustainable development, and well-being.
2. AI systems should be designed in a way that respects the rule of law, human rights, democratic values, and diversity, and they should include appropriate safeguards – for example, enabling human intervention where necessary – to ensure a fair and just society.
3. There should be transparency and responsible disclosure around AI systems to ensure that people understand AI-based outcomes and can challenge them.
4. AI systems must function in a robust, secure, and safe way throughout their life cycles, and potential risks should be continually assessed and managed.
5. Organizations and individuals developing, deploying, or operating AI systems should be held accountable for their proper functioning in line with the above principles.

Legislators and supervisory authorities should take these principles into account in the design and application of financial market regulation.

For some years now, the German Federal Financial Supervisory Authority (BaFin) has also been dealing with this issue. "But the increasing displacement of human decision-makers by algorithms or other forms of artificial intelligence presents us with problems, too," states the President of BaFin, Felix Hufeld. "But what happens when something goes wrong, and errors occur? Can a member of the management board say, 'it wasn't me, it was the algorithm?' In my view: no! The ultimate responsibility has to remain with the management board – with people."

In their very comprehensive study "Big Data meets artificial intelligence" [5], the authors call for comprehensibility, transparency, and explainability of AI procedures, for the protection of privacy through Privacy-by-design, for the development of infrastructures for data sovereignty within companies and for non-discriminatory data analysis.

On the last point of non-discriminatory data analysis, they note: "The result of a system based on machine learning can be unethical and discriminatory for several reasons: because developers or users - consciously or unconsciously - have taught it this behavior or have not prevented it (...) or because the system has learned and adopted existing prejudices from the data. (...) The technical challenge in each case is to translate the ethical/legal concept of discrimination into a mathematical definition so that it can be checked and prevented algorithmically.".

BaFin clarifies for its actions as a supervisory authority concerning the use of AI procedures by financial service providers:

- The responsibility remains with the management of the financial services provider.
- Possible black box excuses are inadmissible - Explainability and traceability of AI procedures is required.
- The existing concepts within the framework of machine-based governance must be further developed.
- The existing documentation requirements must be supplemented by results checks.

It remains to be seen what possibilities the private user of AI-based financial services will ultimately have to enforce his rights. For him or her, it will be difficult or even impossible to discover or even prove a case of discrimination through an AI procedure, for example. That may only manifest itself in a different interest rate for the credit applied for, different (personalized) offers, or a lower quality level of the services provided to him or her.

LITERATURE

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