FINTECH RISK MANAGEMENT
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European Commission

FIRAMIS

Financial Risk and Asset Management with Intelligent Systems

eXplainable AI in regulated financial services

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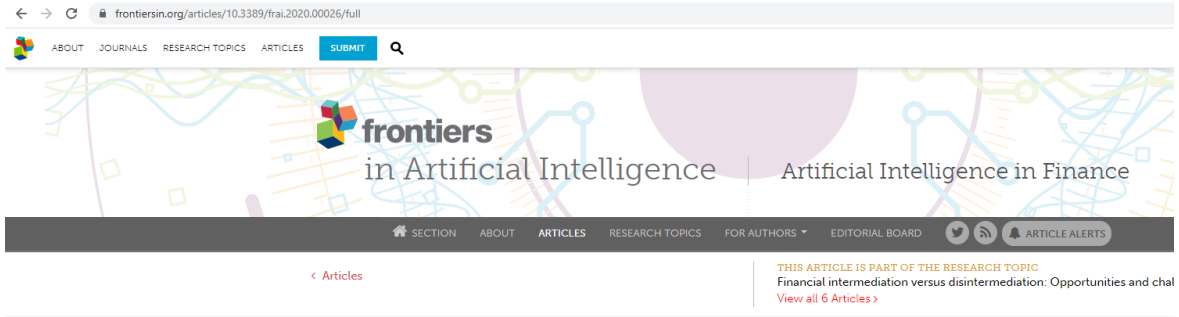
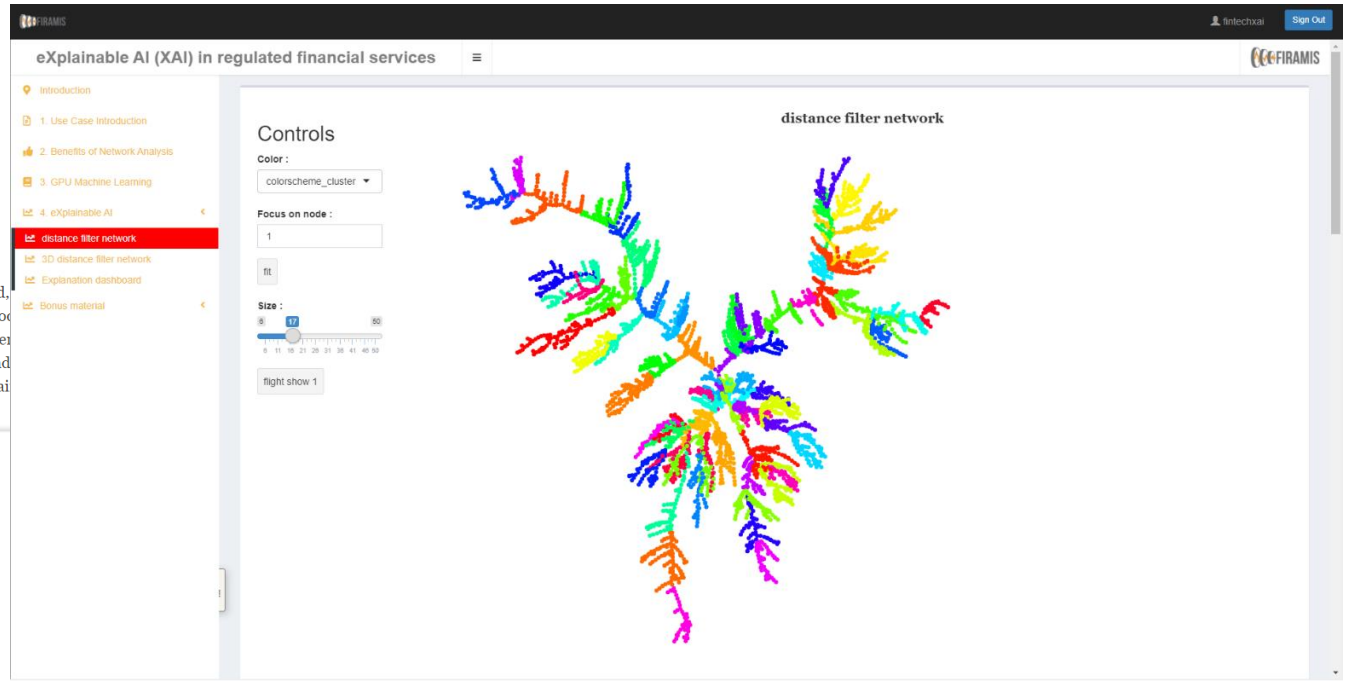
This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 825215. All material presented here reflects only the authors' view. The European Commission is not responsible for any use that may be made of the information it contains.

Visualising the ‚brain' of the AI model





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A Financial Supervision and Technology Compliance Training Programme

We are creating a European training and research programme for shared risk management solutions that automatize compliance of innovative financial companies (RegTech) and, at the same time, increases the efficiency of supervisory activities (SupTech). We aim at connecting FINancial supervision with TECHnological compliance

Structure of the programme

Motivation. Financial Technologies bring opportunities (competitive prices, improved user experience, wider inclusion) but also risks (credit, market and operational risks), amplified by the interconnectedness of fintech platforms (contagion risks).

Aim. The Horizon2020 FIN-TECH project aims at building a fintech risk management platform, which measures risks to make fintech innovations sustainable, for both RegTech and SupTech purposes.

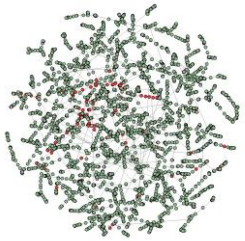
Method. The aim will be achieved creating a knowledge exchange hub, which will eventually lead to a research sandbox laboratory.

Participants. i) Project partners, ii) National supervisors of 29 European countries, iii) European banks and fintechs iv) International regulators (EC,EBA, ESMA, EIOPA, ECB, BIS, OECD, IMF)

Big Data Analytics, P2P Lending and Credit Risk

Motivation. Peer to peer lending platforms that rely on big data analytics for their operations must consider whether they are compliant with existing consumer and investor protection legislation.

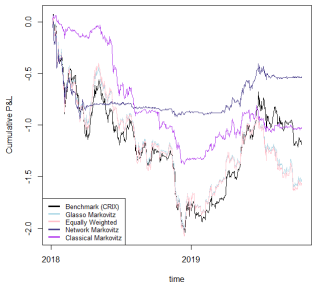
Aim. Develop use cases that show how P2P lending can be improved incorporating in credit risk measurements "network effects" between borrowers arising from their platform interactions. Thus offering an automated, accurate and explainable tool, for both RegTech and SupTech credit risk management.



AI, Robo Advisory and Market Risk

Motivation. Robot advisory platforms that rely on artificial intelligence for their operations must consider whether they are compliant with existing consumer and investor protection legislation.

Aim. Develop use cases that show how market risk management can be improved incorporating in market risk measurements "network effects" between financial assets arising from their correlations. Thus offering an automated, accurate and explainable tool, for both RegTech and SupTech market risk management.



Blockchain, Innovative Payments and Operational Risk

Motivation. Payment and money raising platforms that rely on blockchain technologies for their operations must consider whether they are compliant with existing consumer and investor protection legislation.

Aim. Develop use cases that show how operational risk management e.g (cyber and fraud risk) can be improved incorporating in operational risk measurements "network effects" arising from textual analysis of users' feedback. Thus offering an automated, accurate and explainable tool, for both RegTech and SupTech operational risk management.

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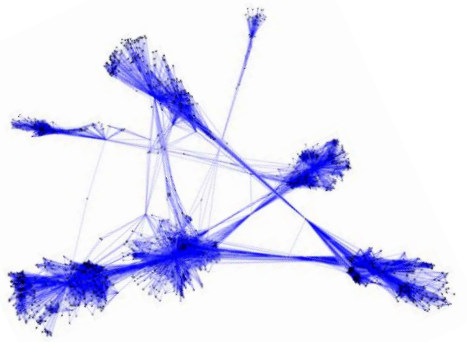
Some of the most trending technologies over the next year will be:



eXplainable AI (XAI) and Graph Analytics, *)

especially in the financial service industry.

They solve the black box problem of many machine learning models and reveal the hidden relationships in financial transaction data.

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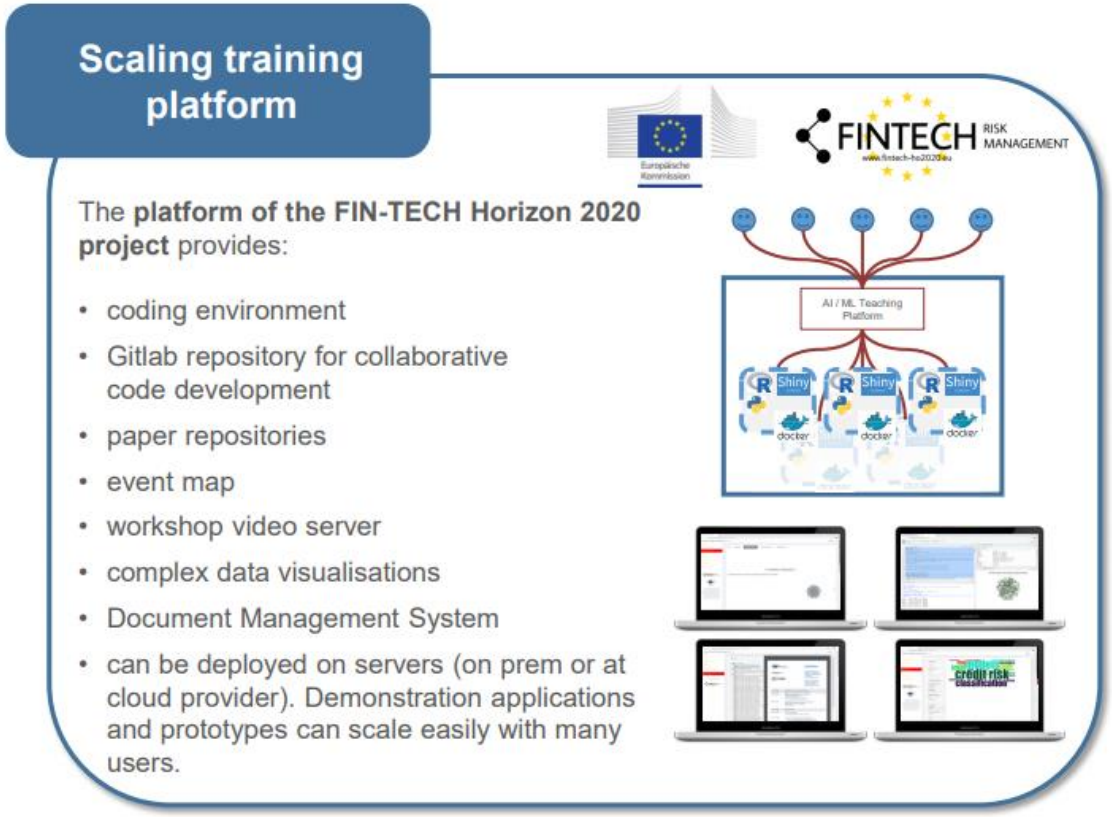
Our FIN-TECH project has created numerous use cases based on XAI and Graph Analytics

These have been discussed with regulators/supervisors throughout Europe:

- European Commission
- the ESAs
- ECB
- and many national supervisors.

The use cases are available in our platform.



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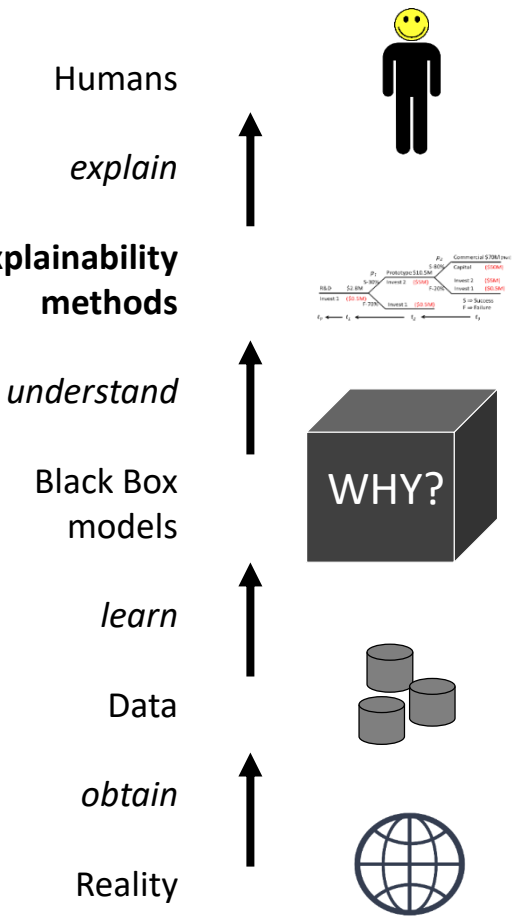
What is XAI?

- ability to explain AI-made decisions
- make its functioning clear or easy to understand.
- XAI ‘proves the work’. It is to trust AI and to accelerate adoption.
- ensuring compliance with expanding regulatory and public expectations and in fostering trust."



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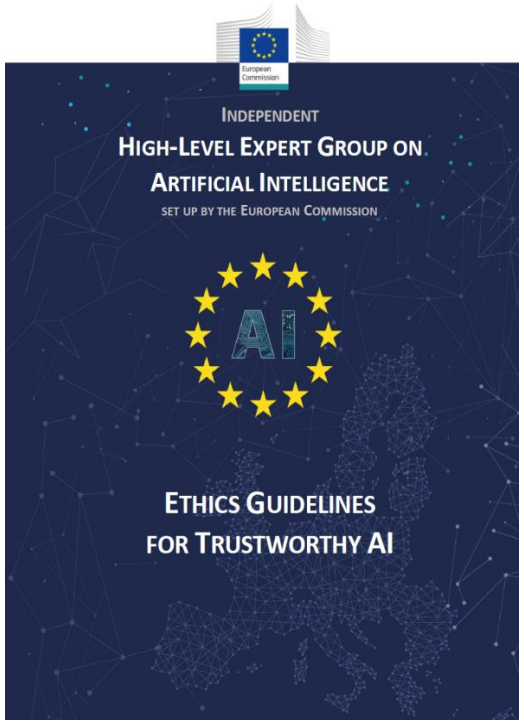
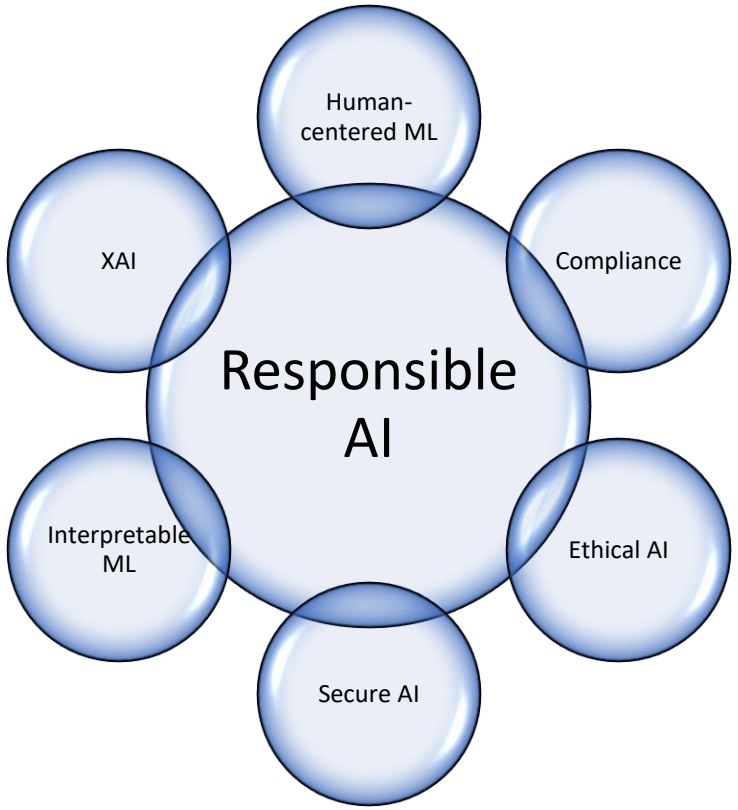
Responsible, trustworthy AI

‘Building an ecosystem of trust is essential. A European approach to AI should ensure that machine-based learning technologies are human-centric, ethical, sustainable and respect fundamental rights and values.’

Pēteris Zilgalvis J.D., Head of Unit, Digital Innovation and Blockchain, DG Communications Networks, Content and Technology &
Co-Chair, FinTech Task Force, European Commission





https://www.datanami.com/2020/04/06/brief-perspective-on-key-terms-and-ideas-in-responsible-ai/

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explanatory gap of AI

‘It is often difficult to know
(i) how reliable the inferred relationship between input and output is and
(ii) which causality exists between them. This is called the explanatory gap of AI. […]
Supervisors have to adjust their approaches and skills to escort the introduction of AI/ML in banking. Banks have to give supervisors sound explanations of what their AI/ML systems actually do, as well as to what end. ‘

Joachim Wuermeling, Member of the Executive Board, Deutsche Bundesbank

page 158 ff.: https://www.eurofi.net/wp-content/uploads/2020/04/views-the-eurofi-magazine_zagreb_april-2020.pdf

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XAI against bias

I mentioned AI earlier and the risk of it becoming a “black box”. It is therefore essential that AI algorithms remain explainable and with adequate governance - to justify why and how a financial decision has been taken, and make sure that no combination of variables will serve as a proxy for a model based on a discriminatory approach

Denis Beau, First deputy governor, Banque de France

Financial inclusion in the digital age: how to make a difference ? SINGAPORE FINTECH FESTIVAL 2019 https://www.banque-france.fr/node/230898

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More opinions by regulators/supervisors

Bank of England (Joseph, 2019) states that “Explainability means that an interested stakeholder can comprehend the main drivers of a model-driven decision.”

The Financial Stability Board (FSB, 2017) suggests that “lack of interpretability and auditability of AI and ML methods could become a macro-level risk.”

The UK Financial Conduct Authority (Croxson et al., 2019) establishes that “In some cases, the law itself may dictate a degree of explainability.”

The European GDPR (EU, 2016): the data subject is […] entitled to receive meaningful information about the logic of automated decision-making.

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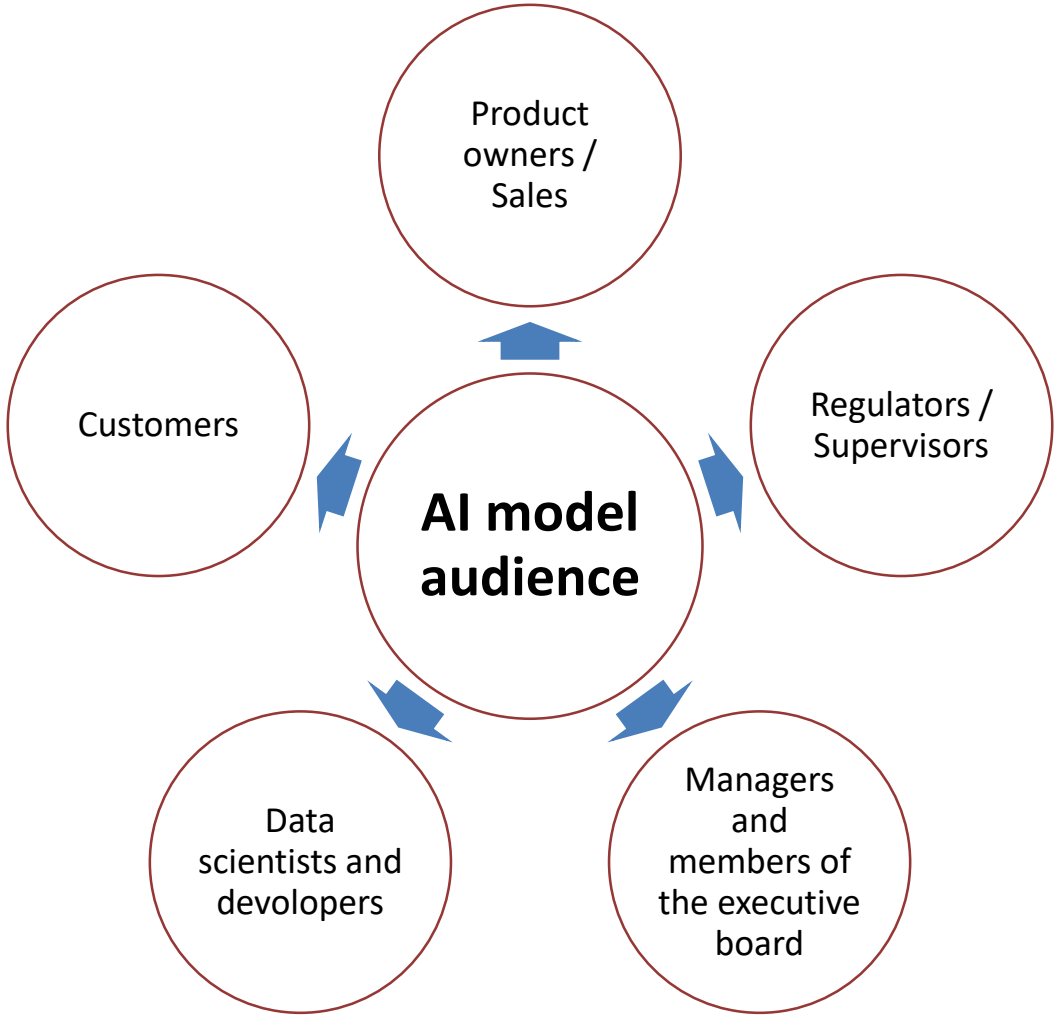
XAI for which audience?



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How humans interface with XAI

- Data and model visualization tools
- Simplification
- Numbers / figures
- Examples
- Local + global features
- Feature interaction and sensitivity
- Textual

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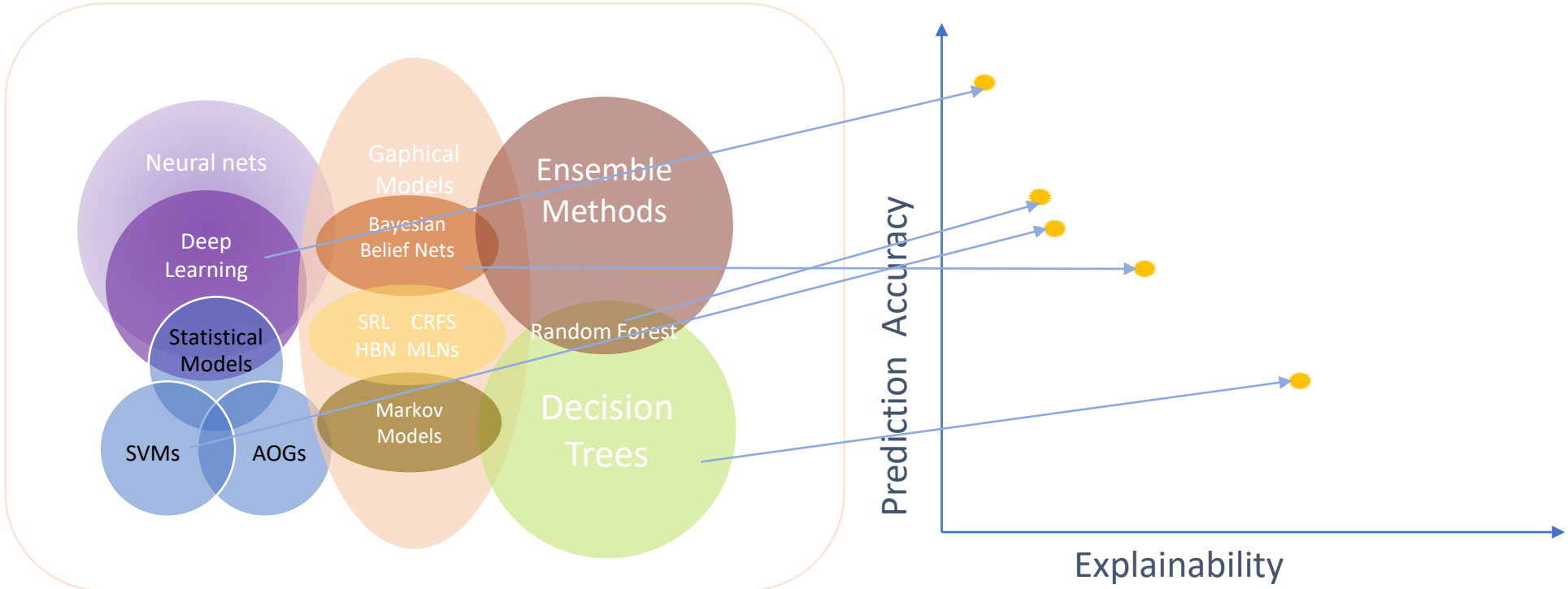
Usual Trade-OFF in ML approaches



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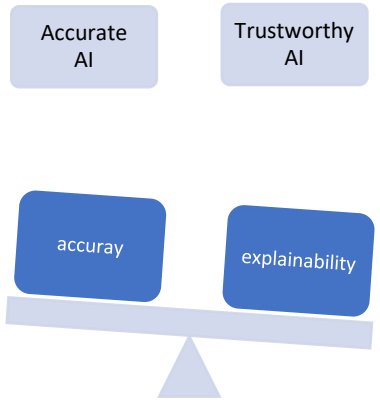
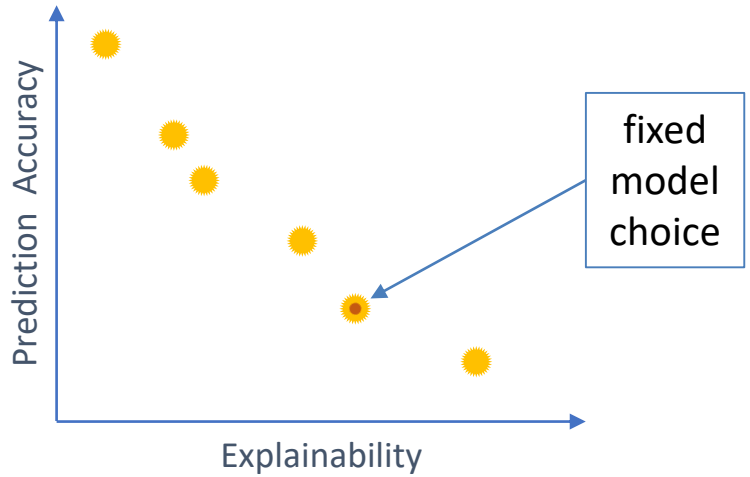
Explainability vs. Accuracy?

Financial Institution chooses the level of accuracy and explainability

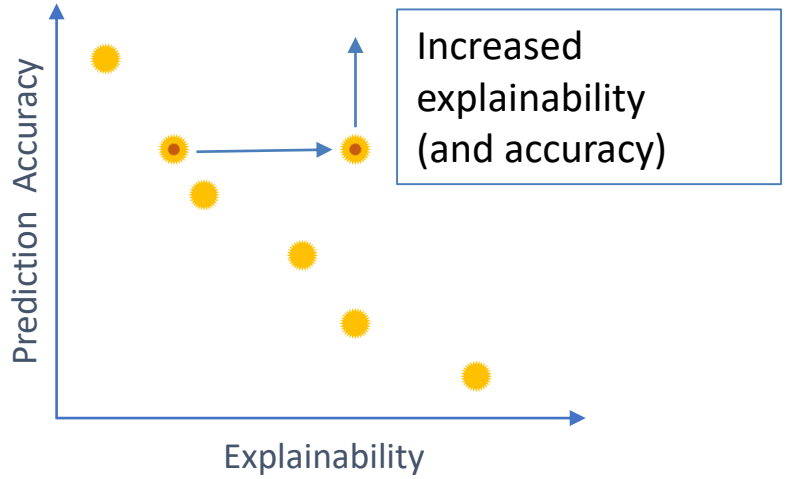




With explantion technologies

Start with a highly accurate model and introduce a layer of explanation technology

Does the output meet strategic requirements?



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XAI and Graph Analytics

Pre-modeling explainability

Goal:
Understand / describe data used to develop models

Explainable modeling

Goal:
Develop inherently more explainable models

Intrinsic

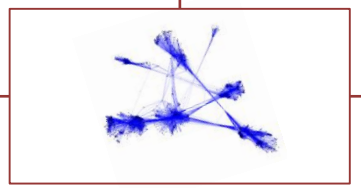
Post-modeling explainability

Goal:
Extract explanations to describe pre-developed models

Agnostic

Network metrics as additional explainbale input features

Visual map to understand linkages, groups and connections of input features



Post-modeling visualization of XAI

Graph theory and representation learning

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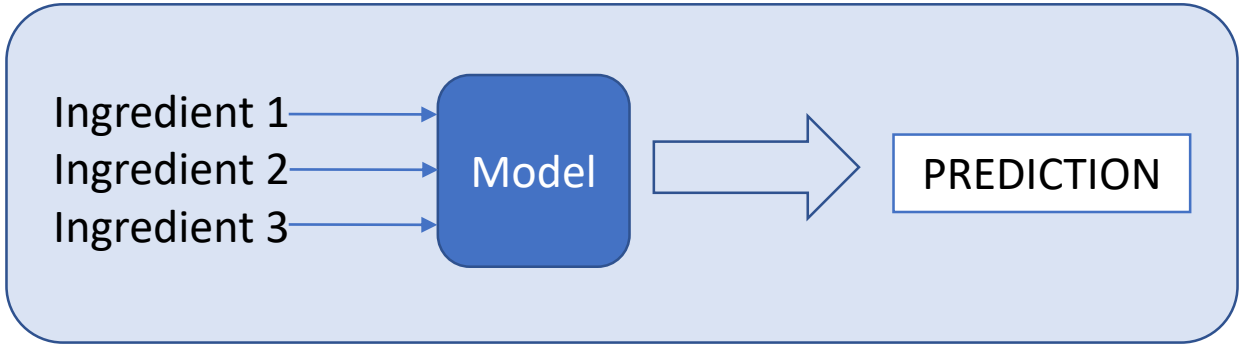
Shapley Values



- Local and global additive variable importance
- Rooted in cooperative game theory
- The feature importance is evaluated by treating the prediction as a coalition game where each player gets a payoff that is fair respect to the gain that the coalition gets from his/her collaboration.

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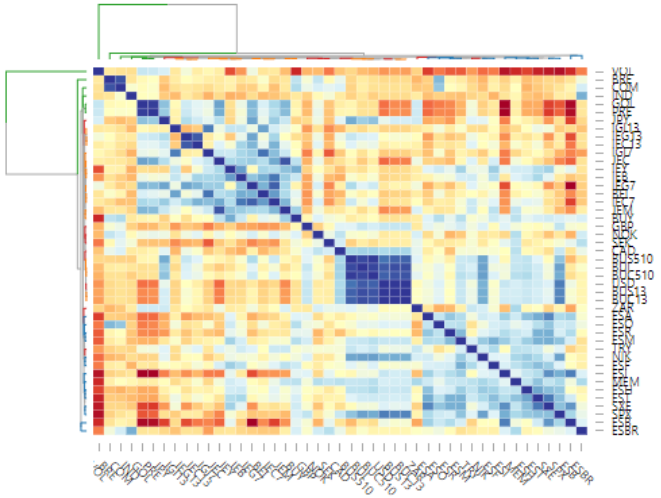
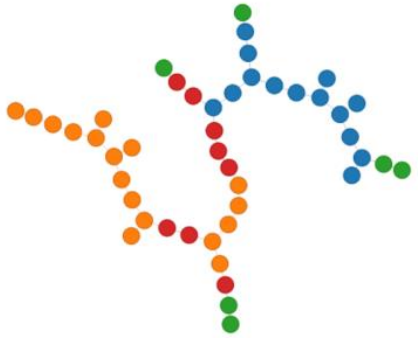
Why network analysis?





Network filtering: shortest and most probable path for the propagation of a price shock

Similarity of variable importance

Hierarchical Clustering: segment data into smaller sets

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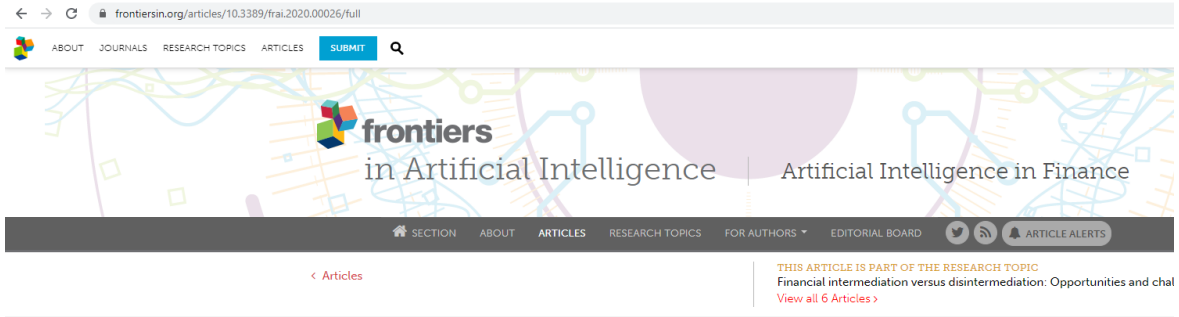

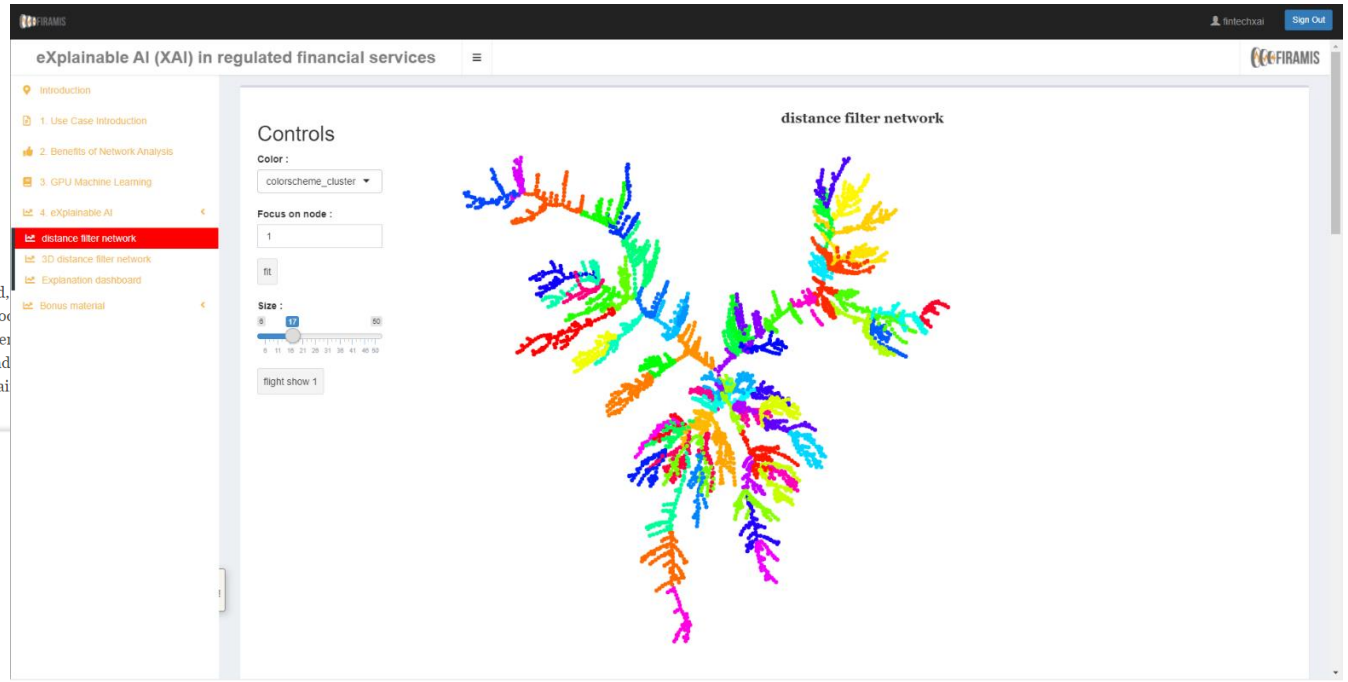

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