Innovative technologies in risk management

The banking industry, an industry that relies heavily on the use of data, is increasingly starting to adopt Artificial Intelligence (AI) and Machine Learning (ML) techniques. Abbas Basrai describes how it can leverage their powerful capabilities.

From chatbots to fraud detection, the banking sector is using AI/ML not only to automate processes and streamline operations for both the front and back offices, but also to enhance overall customer experience. AI and ML tools, with their advanced prediction techniques and capabilities to utilize large volumes of data, are increasingly being used in risk management, for quicker and more efficient credit, investment and business-related decision making.

A host of benefits

In risk management, AI/ML has become a symbol of improving efficiency and productivity while reducing costs. This has been possible due to the technologies' ability to handle and analyze large volumes of unstructured data at faster speeds, with considerably lower levels of human intervention.

AI/ML powered risk management solutions can be also used for model risk management (back-testing and model validation) and stress testing, as required by global prudential regulators, providing a range of benefits:

— **Superior forecasting accuracy:** Traditional regression models do not adequately capture non-linear relationships between the macro economy and the financials of a company, especially in the event of a stressed scenario. Machine learning offers improved forecasting accuracy due to models' abilities to capture nonlinear effects between scenario variables and risk factors.

— **Optimized variable selection process:** Feature/variable extraction processes take up a significant amount of time for risk models used for internal decision-making purposes. Machine Learning algorithms augmented with Big Data analytics platforms can process huge volumes of data and extract many variables. A rich feature set with a wide coverage of risk factors can lead to robust, data driven risk models for stress testing.

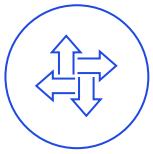
— **Richer data segmentation:** Appropriate granularity and segmentation are critical to deal with changing portfolio composition. Machine Learning algorithms enable superior segmentation and consider many attributes to segment data. Using unsupervised machine learning algorithms, combining both distance and density-based approaches for clustering, becomes a possibility, resulting in higher modelling accuracy and explanatory power.

Risk assessment

Credit scoring, credit underwriting, stress testing

Portfolio management

Customer segmentation, recommendations



Trading

Algorithmic trading

Customer support

Chatbots, robo-advice

Fraud prevention

AML and fraud detection

Pattern recognition

Knowledge based system

Deep learning

Voice/image recognition

Machine learning

Natural language processing

3 Evolving infrastructure capabilities

4 Connected control and risk frameworks

Use cases: staying ahead of the curve

Credit risk modelling

Banks traditionally use traditional credit risk models to predict categorical, continuous, or binary outcome variables (default/ non default) as machine learning models are difficult to interpret and are not easily verifiable for regulatory purposes. Nevertheless, they can still be used to optimize parameters and improve the variable selection process in existing regulatory models.

AI based decision tree techniques can result in easily traceable and logical decision rules despite having non-linear characters. Unsupervised learning techniques can be used to analyze data for traditional credit risk modelling while classification methods such as support vector machines can predict key credit risk characteristics such as PD (probability of default) or LGD (loss given default) at a loan level.

Fraud detection

Banks have been using machine learning methodologies for credit card portfolios for years, with credit card transactions presenting banks with a rich source of data with which to process and train unsupervised learning algorithms. These algorithms have historically been highly accurate in predicting credit card fraud due to models' ability to develop, train and validate huge volumes of data.

Credit card payment systems are embedded with workflow engines that monitor card transactions to assess the likelihood of fraud. The rich transaction history available for credit card portfolios presents banks with the ability to distinguish between specific features present in fraudulent and non-fraudulent transactions.

Trader behavior

Technologies such as natural language processing and text mining are increasingly being used to monitor trader activity for rogue trading, insider trading and market manipulation.

By analyzing email traffic and calendar related data, check in/check out times, call times and trading portfolio data, systems are able to predict the probability of trader misconduct, saving millions in reputational and market risk for financial institutions.

Risks and challenges

There is no doubt that AI and ML, if implemented properly, can transform the banking industry. Vast amounts of data and sophisticated techniques may be used to build models that enhance risk management. However, there is a downside. These models amplify many elements of risk, and may be inadequate when dealing with current mechanisms and frameworks.

For example, traditional models (such as logistic regression), which are often based on clear statistical theories, use linear and low dimensional data as inputs. ML models, such as neural networks, utilize features such as dynamic training, high-dimensional data, hyper parameters, complex non-linear relationships, and linkages. Such features often render these models less transparent compared to traditional models. This, in turn, elevates model risk, as associated risks are harder to identify and assess. As a result, many banks are proceeding cautiously, restricting the use of AI and ML to low-risk applications.

Nevertheless, AI is being increasingly recognized across industries for its potential to significantly overhaul the day-to-day activities of a business. The technology has enabled banks and FIs to lower operational, regulatory, and compliance costs while simultaneously providing banks with accurate credit decision making capabilities.

AI/ML solutions have the potential to transform the financial industry, arming it with trusted and timely data for building competence around their customer intelligence, enabling successful implementation of their strategies and restricting potential losses.

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