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Point of View

XAI: Unmasking the Black Box

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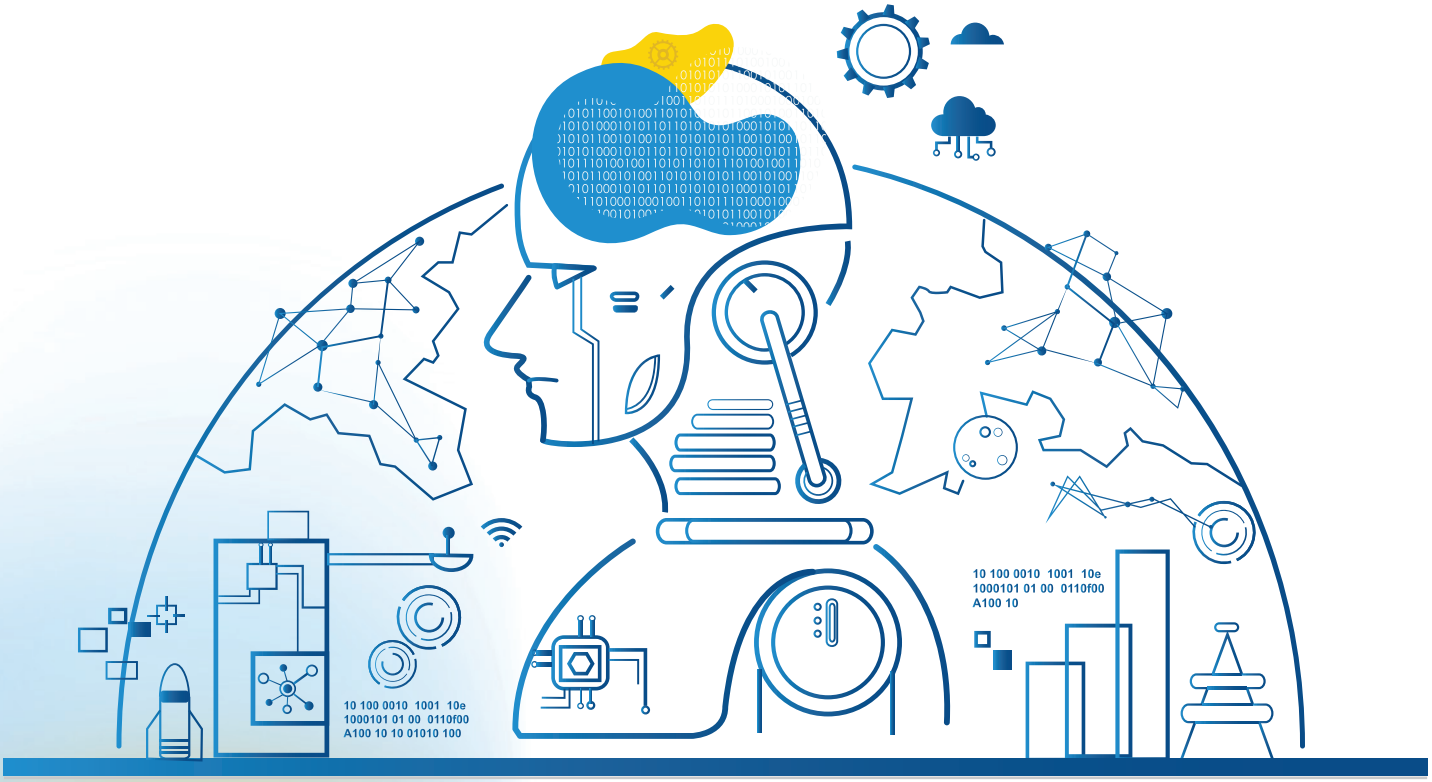
Deep learning algorithms of Artificial Intelligence (AI) and Machine Learning (ML) are increasingly demonstrating remarkable performances across industry verticals. However as observed in numerous meetings, both clients and internal stakeholders have one common thread that is equivocally expressed – the interpretation of Machine Learning outputs. Whenever codes or algorithms are run, most often, the viewer is inundated with outputs which leaves a rookie user staring in the face of a black box—a metaphor used to describe how one can't really inspect how the algorithm is accomplishing what it is accomplishing.

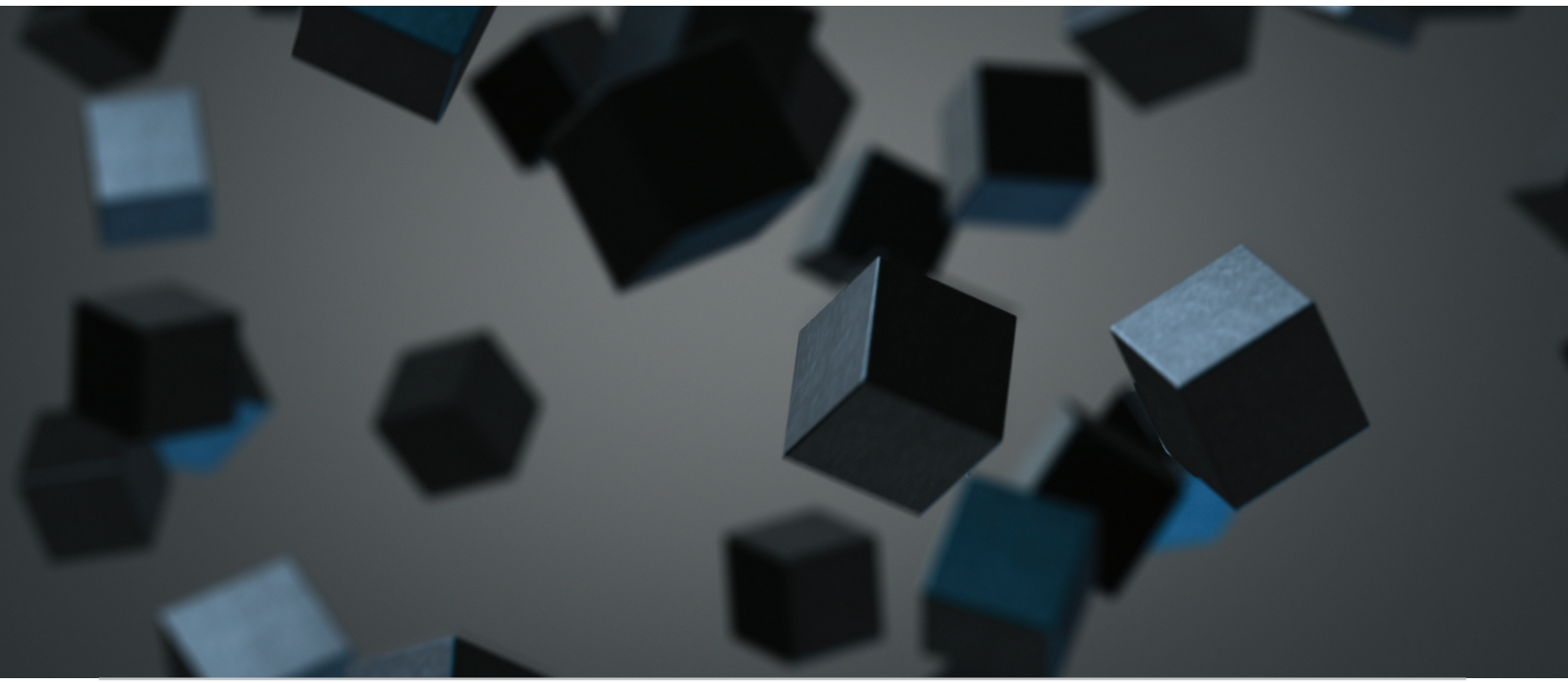
Explanations for machine decisions and predictions are needed for accountability and transparency, more so when they are employed in certain industries, for instance in the medical sector. This requires a greater level of interpretation, which often means that the underlying mechanism of the algorithms must be understood.



A Transparent Black Box – Vital for Accurate Business Decisions

Despite interpretations being available, they are found only at a gross or superficial level. However, we live in an era of micro-segmentation, where one is required to define our audiences, conduct target-based marketing and design suitable campaigns to reach every single customer. Gross or a blanket interpretation that lead to carpet bombing techniques to target customers have typically shown only average results in terms of ROI, and therefore no longer work.

The core of targeted marketing rests on the pillars of precise understanding and acknowledging the fact that there is no hard and fast rule to understanding what drives a customer; what works for one, may not necessarily work for another. In essence, each customer is unique and they expect solutions to be tailor made to suit their preferences. Various industry domains including entertainment with new formats like OTT, Telcos, BFSI, Leisure, Web, etc., have already started looking at this in a deeper way. This makes it all the more important to cull out the unexplainable and focus on the explainable as heavily weighted business decisions will be based on the resulting outputs. This is where Explainable AI comes into the picture.



Understanding Explainable AI and our need for it

With the quick growth of Machine Learning across industries the impact and potential after-effects cannot be disregarded.

In certain industries, failure is not an option. Even a momentary disfunction in the computer algorithm can prove to be disastrous. For instance, disfunction in an autonomous vehicle can cause fatalities. Therefore, interpretability and 'explainability' of ML algorithms have become pressing concerns. This is now possible with Explainable AI (XAI).

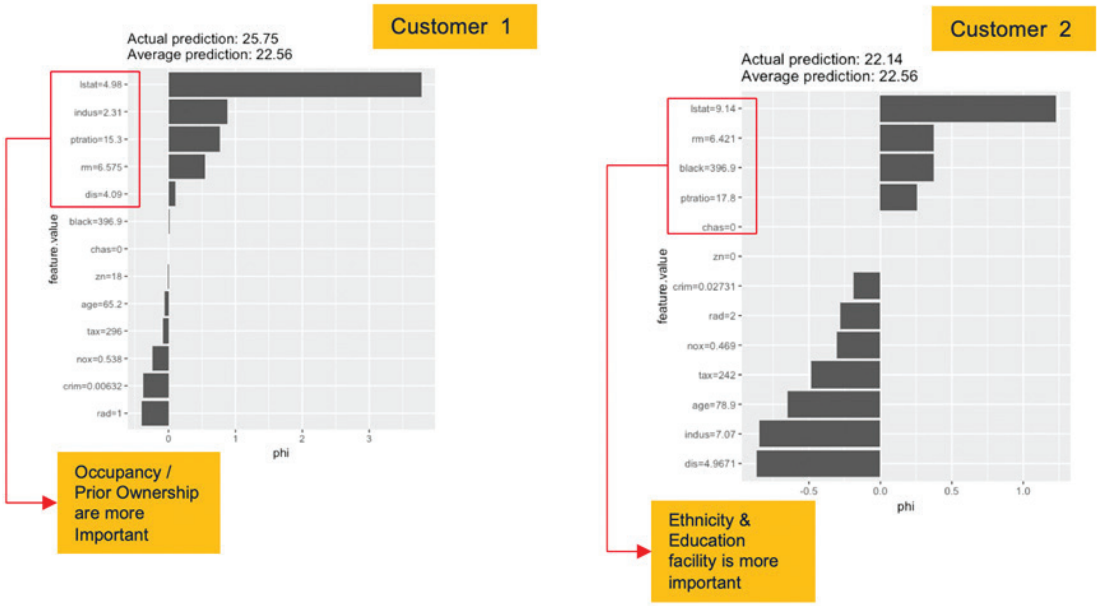
Explainable AI using interpretable assessment techniques, enables the ML community to now keep track of how algorithms are used and how their uses can be improved upon. It emphasises on the role of the algorithm not limited to providing an output but to also share with the user supporting information on how that conclusion was achieved. XAI aims to throw light on an algorithm's inner workings and to provide insights on what factors influenced the output. One of the main reasons for the rising popularity of XAI is to make available information legible for humans, rather than it being hidden under code.

XAI brings specific benefits in various areas. For the business, Explainable AI reduces the occurrence of Black Box syndrome. With a laser focus on the various lines of business, it provides well informed reasonings at a granular and transactional level. All the 'what's' are explained with a why. For data scientists, XAI provides deeper clarity on the approach of performance verification, higher accountability of data. It also helps with proper governance by providing better sampling methodologies. From an architectural and framework standpoint, XAI offers well planned and futuristic data flows and a proactive data architecture, with supporting applications for specific data segments. When it comes to UX/UI, XAI also offers a better customer user experience owing to greater clarity on the underlying reasoning behind customer behaviour, patterns and preferences. Finally, XAI helps interpret customer behaviour as it helps an organization become more cognizant of its customer needs through the building of an intelligent organization

Current XAI challenges

Currently, XAI uses model equation and outputs to summarize the overall understanding globally in terms of equation structure, variable importance and model performance metrics. However, global construction involves all expressions at a summary level only. Now when we apply this to the fact that every customer is unique with individual tastes and preferences, we understand that we need to fit models and predict more accurate prices to reach each individual customer. This means a global approach in model construction to predict is less likely to fit. Hence, to understand local slivers of information, we need Local Surrogate Model Structures. This will require a framework which tries to understand the differences at the most granular level with the capability to unravel the factors that aid or abet the cause of business interest

There are currently a few frameworks, at the heart of which lies the Coalition Game Theory, with the ability to generate Local Surrogate Model Structures. The SHAP (SHapley Additive exPlanations) framework is one such model that uses a game theoretic approach to explain the output of any machine learning model. Leveraging game theory and their related extensions it connects optimal credit allocation with local explanations using the classic Shapley values. The below snapshot of the SHAP framework at work shows how each customer is analysed and the factors that differentiate them from one another.



XAI—vital for achieving ROI from AI projects

As demonstrated above, achieving maximum ROI from AI projects is only possible when XAI opens up what is now currently being obscured by a black box. However, this requires a shift in organizational mindset. By viewing XAI as a factor that drives business growth and not as an overhead cost, organizations have the opportunity to view XAI as a valuable asset—one that helps businesses make more sound and informed decisions.

Author profile

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With 24+ years of expertise in statistics & data science, Venkatesh CG has spearheaded several industry-specific strategic advanced analytics solutions. With his broad experience, he has designed and implemented data analytics solutions for many Fortune 500 clients across industry verticals. CG is also associated with Indian Statistical Institute (ISI), CMI, IEEE, AICTE and various other universities & public institutions for his passion for extended interactions with budding data scientists and academicians.

An acclaimed analytics thought-leader, CG has always been technology guru in his various roles in academia & business (at SAS, Accenture etc.). He currently heads the Data science & AI practice at Larsen & Toubro Infotech (LTIMindtree).