KMK

UNLOCK FORWARD LOOKING INSIGHTS VIA MACHINE LEARNING

Data driven commercial analytics from general empirical to granular

With an eye on the future, machine learning is reshaping pharma commercialization

Data is one thing a pharmaceutical commercialization department has in abundance. Pharma companies collect data from such a wide range of sources for different uses with a sole purpose: To promote the most effective care and therefore, maximize overall patient wellness. However, how well are we leveraging the booming amount of data in recent years? Deviating from multiple angles and levels of data, many brand teams still rely on conventional approaches delivering information by focusing on limited perspectives (such as historical prescription and specialties). However, this approach lacks a way to tie together insights from seemingly unrelated datasets.

Still, with drastically growing computational speed and memory, this extensive and rich data will be a real-world proving ground for machine learning to solve the key questions in commercialization – how to best evaluate demand and optimize resources to resonate with customers – when using a more data-driven approach. In other words, the pharma industry is now embracing the opportunities that machine learning offers to scale up efforts and shift from general to the granular, so that a maximum value is delivered via all business operations processes.

Machine learning is when computers are programmed to "learn" and undertake complex judgmental decisions by utilizing massive amounts of data without human intervention. Take physician segmentation for an example. Many companies rely on historical information as a guideline, and believe high prescribing physicians in the past will be valuable in the future. This type of looking back approach has its inevitable disadvantages. It will most likely miss out on promising instances of the future.

Today's machine learning techniques provide us with a solid basis from which to look forward. With the help of machine learning, pharmaceutical managers can start thinking about the next area where one can bring added value to the HCP or patients. Ultimately, one can make predictions with a high degree of accuracy when providing a streamlined, case-by-case customer experience.

The challenges in addressing tomorrow's market

Before enjoying the benefit from advanced analytics enabled by modern technology, a couple challenges lie in the way. The first being the complexity in organizing data. This challenge could include the availability of data and its integration across multiple data sets routinely generated, collected or purchased from internal and external sources; the likely lack of data quality assurance; and data's high maintenance cost. Leveraging a scalable transparent code-free environment for data integration with multiple sources is ideal to enable advanced analytics such as machine learning.

The second challenge is perhaps more difficult to overcome. This challenge is the acceptance of unjustifiable analytical results. After decades of being used to any analytical observation as the result of a cause, it is counterintuitive to blindly believe what machines tell us. Nonetheless, the development of a culture which embraces such ambiguity, especially when commercial insights cross the model recommendation, demands that future pharma managers possess solid analytical skills as well as extensive commercial domain knowledge in order to bridge the analytical outcomes and the actionable business plans.

A Decision Tree illustration – one type of a machine learning model.

The advantages in using machine learning

With properly implemented data organization, advanced analytics powered by machine learning allows pharma managers to literally throw any type of data into the blend without worrying about messing it up. Practical models used today are still just as intelligent as the one that sets them up. However, this could soon change with the advancement of smart data crawlers. In the very near future we anticipate that web crawler applications, coupled with machine learning algorithms, can intelligently grade any accessible information to help answer the question. Will the flap of a butterfly in Brazil affect a doctor's writing behavior in Michigan? Maybe, even though not apparent.

Implementing machine learning in product commercialization sharpens a brand's unique competitive advantages. Pharma managers gain a deep understanding on the brand's position within the market, and are able to formulate strategies for better outcomes. The marketing team will understand the driving force behind each initiative and therefore can design tailored campaign strategy for each individual audience. The sales team will be equipped with personalized recommendations to proactively and promptly reach out to physicians and patients in a dynamic setting.

A Real-World Case: Machine learning for early adopter physician identification

A recently conducted project attempts to determine the prescribing behavior of a branded medication in order to identify the next HCP candidates to adopt the brand. At first glance, this is a rather typical application of machine learning modeling – a classification problem. However, nothing is typical when it comes to the pharmaceutical industry.

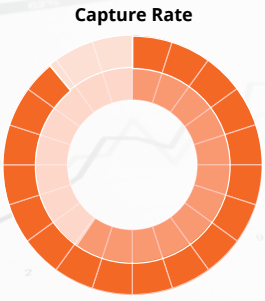
The sources of elements going into the machine learning model includes the commercial data such as retail/non-retail, product/market Rx from all channels, demographic information, affiliation, commercial activities from both the brand or the market, market access such as managed care pull-through, and the patient journey. Clinical research information was deliberately left out of the equation due to complexity.

Even so, to look into the future based on these datasets introduced tremendous complexity to the analysis. The first hurdle to overcome was the non-linear relationship among these elements. One cannot compare the percentage patient switch from another brand with the TRx number or HCP specialty. Most of the variables do not convert on a quantifiable basis. The second challenge is that some of the variables in the blend are static while others may be dynamic with some being impactfully dynamic and others being "out-of-control" dynamic. For example, HCP demographic information is mostly static. Brand activity is impactful dynamic, and formulary changes are the "out-of-control" type of dynamic.

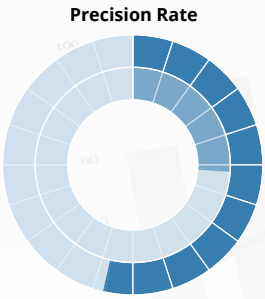
All this being said, a seemingly typical classification problem had to be handled via deep learning methodologies with not one, but many models, which later combined with so-called model stacking to yield the final outcomes.

Machine learning doubles the accuracy rate in identifying early adopter HCPs versus volume driven targeting.

Outcome Illustration of Physician Prescribing Behavior



89% - Machine Learning
vs. 59% - Volume Driven Targeting



54% - Machine Learning
vs. 26% - Volume Driven Targeting

The machine learning engine allowed the analytics team to explore every possible variation of the input data and test different methodologies demonstrating the significant impacts on the prediction rate. Testing with conventional benchmark methods observed 7%-26% precision rates in capturing early adopters, whereas the machine learning model raised the precision to 16%-65%, both depending on the target universe sizes and the therapeutic class.

A Hypothetical Case: Overcoming Physician Access Restrictions

Pharmaceutical sales reps are facing the challenge of shrinking access to physicians, not only due to a more restrictive regulatory environment, but also to the new healthcare business models such as the variety of non-personal promotions in marketing promotions (TV, social media etc.). Therefore, making a greater impact in less time to vital physicians becomes essential to sales success. This situation requires sales leadership to provide a more targeted message for rep delivery in different sales scenarios. The more detailed and relevant the information with which the reps are armed, the higher the chance that they are able to successfully meet the needs of high decile prescribers.

Solutions to improve physician access by leveraging machine learning:

1. **Precision Targeting and Segmentation**
   Machine learning has many classification methods to identify the targets who more likely need to write scripts for a particular condition. Rather than being based largely on historical volume, the machine learning model can incorporate multiple angles of HCP characteristics and activity, including demographic information, writing behaviors, and promotion involvement to exploit the crucial features of a valuable physician.
2. **Identifying and Sharing Sales Force "Best Practice" Messaging**
   By using big data to capture user action and learning from this process, one can customize individual physician's needs and convey a real-time content recommendation to sales reps. Basing analysis on different stages of the sale cycle, one can gather and share effective messages tailored to physicians throughout the life cycle of the brands.
3. **Stronger Customer Engagement On Personalized Multi-channel Promotion**
   Machine learning has the power to uncover users' content preferences, channels and timing of information delivery. This alleviates the growing access restrictions sales reps meet today. When gathering user engagement and feedback from multiple sources of marketing promotions, one can better allocate the right resources to customers in their desired method of communication, timing and content. By leveraging this, companies can improve TRxs and improve profits by utilizing non-personal promotion methods when suitable.

Conclusion:

With the analytical world flooded with all types of data getting more and more granular as days go by, machine learning further enables pharmaceutical managers to catch opportunities and monitor commercial activities in today's world. Simplified small scale machine learning tools will soon be available at every pharmaceutical manager's finger tips. With the introduction of more visualized and code-free analytical platforms, machine learning will enjoy sustained growth in the healthcare sector. As much as we are amazed by the amount of insight that solid data science technique coupled with deep domain knowledge can bring us, technology advancement will continue to help narrow the gap between data and actionable business insights.

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Bo is a Director at KMK Consulting Inc. He has an education background in quantitative analytics and holds a Master's Degree in Operations Research from Cornell University. Bo spent the last 10 years focusing on commercial strategies and analytics for the pharmaceutical and bio-science industries. His areas of expertise includes: sales force optimization, forecasting, go-to-market strategies, CRM, incentives, patient-based modeling, market access analytics, and business intelligence.

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KMK Consulting, Inc.

KMK Consulting, Inc. is a full-service consulting firm specializing in commercial operations support to the life science industry. Since our inception in 2000, KMK has grown to have more than 120 full-time employees, providing analytical support to clients on-site, as a project, or as SaaS that helps drive business decisions and improve the efficiency and effectiveness of commercial analytics and sales operations. We eliminate complexities for commercialization leaders by integrating:

- Accurate Marketing and Sales Analytics
- Market Research
- Sales Ops Software
- RWE/Health Economic & Outcome Research

KMK Consulting draws upon solid machine learning techniques as well as extensive commercial insights to conduct data service and machine learning models to improve business results. KMK Consulting's data service team has a scalable cloud-based platform for data storing and integration with multiple sources for advanced analytics applications. Our platform is mainly powered by Alteryx, a fully transparent, code-free environment suitable for a wide user base. Our capabilities include dynamic targeting and segmentation, response analysis, KOL mapping, ROI measurement, task automation and more. Of greater consequence, KMK Consulting will uncover critical insights from the machine learning results to ensure the conclusions are relevant and justifiable, which helps build buy-in and trust from the brand team in analytics.

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