bigsquid™
Smarter Decisions. **Faster.**
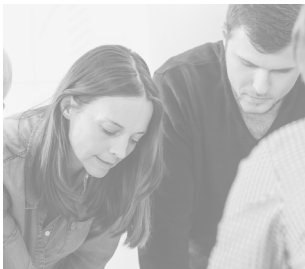
Machine Learning For

Executives

20
19

Machine learning allows us to gain insights from the data and use them to improve every facet of life.

Its usefulness goes beyond knowledge gathering.

The relatively recent proliferation of affordable, easy-to-use business intelligence (BI) tools has given rise to an unprecedented prioritization of data-centered initiatives. No longer exclusive to the mega-corporations, BI has entered the mainstream and become the status quo. This large-scale adoption and subsequent ubiquity of BI tools has changed the way organizations approach the curation, organization, and analysis of data. Where previously data were used to describe what had happened, business leaders are no longer content relying solely on insights fueled by a retrospective analysis. Just as BI was once a substantial competitive differentiator, today it is those companies with access to the predictive insights made possible by machine learning that will begin to pull away
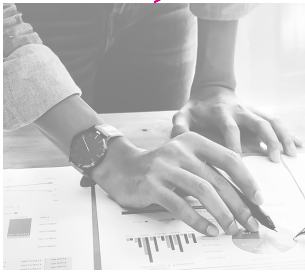
However, with any burgeoning technology, there are 3 types of responses. First, many organizations rush to embrace new tech as the "silver bullet" that will finally cure all their woes and propel them into the next century ahead of their competition. Leadership puts pressure on department managers to bring in a new tool as quickly as possible without the planning, strategy, or infrastructure to support it.

Second, there is hesitation. Machine learning is still, for many business leaders, shrouded in mystery, intimidating, and carries an almost science-fictionesque connotation. This may be due in part to Hollywood's treatment of AI in film and television. Regardless of the reason, many leaders are resistant to any new technology until other organizations have used it and found success.

Finally, there is the third group. These leaders are forward-thinkers, but understand the need to have processes in place to support the new technology prior to making any investment. They want to make sure the new technology is the right one for their organization and culture.

However, to be successful, it is imperative that leadership understand for themselves what AML is, what it can/ can't do, and what challenges they will need to overcome in order to achieve the greatest possible ROI.

Paired with the existing BI tool, automated machine learning (AML) can be the catalyst that transforms your decision making–which has previously been based solely on historical data–to decision making using forward looking data. Essentially, AML helps decision makers understand not only what had happened, but also what is likely to happen tomorrow as a consequence of today's choices.

What is Machine Learning?

Machine learning is the science of programming computers so they can learn from data. This is very different from traditional programming paradigms where explicit rules are defined and hard-coded into a computer program to teach it how to do a task. With a machine learning approach, we don't "teach" a computer how to do something; instead, we expose it to a dataset and let it learn how to do a task on its own based on patterns it found in the dataset.

Machine learning approaches have proved successful in a variety of applications, including computer vision, voice recognition, natural language processing, and recommendation engines. In the world of business intelligence, machine learning algorithms are being used to analyze historical data, find patterns across large sets of business metrics, and making smart business predictions based on those patterns.

Basically,

> *"machines are given sets of data and use that data to drive future decision making. The more data a machine has access to and the more decisions it makes, the smarter it becomes."*

The applications for machine learning are practically infinite and industry agnostic. Any organization that collects and uses data can leverage machine learning to gain access to vital information that was previously inaccessible.

Machine learning applications

It would be impossible to list out the many ways organizations and individuals are leveraging this technology. Regardless of industry, there are many organizations using machine learning to solve both minor and complex use cases depending on need and resources. It is important, however, to remember that machine learning applications exist on a very broad spectrum of complexity.

On one hand, big companies like Google and Amazon are leveraging machine learning to solve immensely complex problems. These applications are far outside the capacity of most companies. On the other hand, many organizations find significant value automating tasks and solving more pressing organizational concerns such as customer churn, employee retention, and forecasting future sales.

Health Care:
Google is using an automated detection algorithm to help pathologists identify breast cancer in pathology slides. Essentially, Google is using images to train algorithms that were optimized for localization of breast cancer that has spread (metastasized) to lymph nodes adjacent to the breast. While it can't (and shouldn't) replace the pathologist, this application can greatly reduce the pathologist's workload and help improve consistent diagnosis by going through thousands of images in seconds. Machine learning can be trained to look at images, identify abnormalities, and point to areas that need attention, thus improving the accuracy of all these processes.

Real Estate:
Machine learning is used on both the buying and selling ends of real estate and is helping realtors dramatically reduce the time and frustration typically associated with buying and selling homes. In one example, real estate company Landis, is using machine learning to help detect when sellers might be selling a home before they put it on the MLS. They have also found that they can use this technology on the buying side, "by uploading data about previous purchases and holdings – including deals that they bid on but didn't win – machine learning algorithms can automatically identify the homes that possess the features that the institutional buyers desire the most." Armed with machine learning, Landis has been able to take a traditional real-estate transaction that usually takes six to eight months and reduce to about 40 days total.

E-commerce:

Understanding the Lifetime Value (LTV) of your customers will help you to know whether marketing is targeting the correct audience or not. Many companies use AML to identify buying patterns starting from a customer's first purchase to help them forecast the LTV of each customer. With this data, they can predict the likelihood of future purchases as well as the product a customer is likely to buy. This helps marketing use very specific messaging in email and ads to target a customer who is meets the criteria of a valuable long-term customer. Not only are these companies targeting new customers with specific messaging, but they are able to nurture and show value to existing customers.

Higher Education:

While the above examples fall on the complex end of the spectrum and require significant investments in time and data scientist resources, not all applications are so complicated. USC's Suzanne Dworak-Peck School of Social Work uses Big Squid's Kraken platform to predict which applicants are likely to drop out and which metrics are leading indicators of a student likely to drop out. Now they can better predict "melt" rate and diagnose why applicants fail to enroll and take action by proactively reaching out to those applicants who may need more guidance, support, counseling and tutoring services.
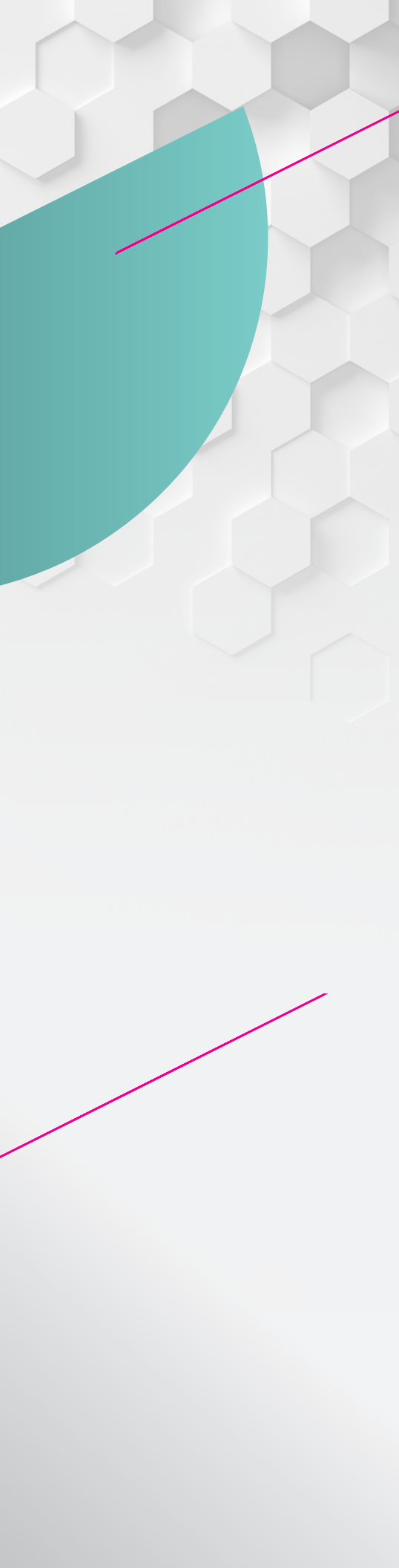
How can machine learning benefit your organization?

As demonstrated, machine learning is becoming increasingly pervasive and we've only scratched the surface on it's application and potential. However, as a business leader it wouldn't be prudent to rush in with a massive investment of resources without first addressing the basic question, "How will this benefit me as a leader and how can I use it to benefit my organization?" James Billot of Altviz offers a basic, universal answer:

Machine learning allows us to gain insights from the data and use them to improve every facet of life. Its usefulness goes beyond knowledge gathering. Machine learning can help automate repetitive and low value tasks and thus decrease costs across the board. At the same time, it allows your team members to focus on higher value tasks so that you can create more and increase productivity and earnings giving you the best of both worlds.

If you are fortunate enough to already have an inhouse data scientist, then you are ahead of the curve and have an edge on many of your competitors. However, it is likely that between building and deploying custom machine learning models and managing your analysts, your data scientist doesn't have the bandwidth to take on the more complex tasks that only they can do. With an automated machine learning tool, your data scientist can confidently delegate specific tasks to the analysts, thereby creating what's known as "Citizen Data Scientists" and take on the highly complicated, technical tasks only they are capable of accomplishing.

In an **ideal scenario** your organization would see significant ROI from an investment into automated machine learning in multiple ways:

1. Uplevel existing analyst teams. Handing over additional responsibilities and training to your analysts makes them more valuable to your organization. It fosters loyalty and expedites the building and deployment of crucial models.
2. Scale your data scientist. An inhouse data scientist is a large investment and they need the ability to focus on solving more complicated business challenges that require extensive statistics or applied machine learning knowledge.
3. Solve major use cases that result in increase profit/ decrease spend. Your analysts can work to address common issues such as employee/ customer churn, increase repeat customers, identify and target ideal customers, and much more.
4. Catch major issues early on. As your organization prepares to implement AML it will usually need to undergo a "data cleansing" to get the data ready to import. This process is extremely helpful to identify missing or incomplete data sets as well as reveal gaps in data collection. While it may be an unintended consequence, identifying bugs is as valuable as coming up with solutions.

The next step is to understand how you as a leader can be instrumental in bringing automated machine learning to your organization and giving it the best chance to be successful.

What is your role?

Successful implementation of automated machine learning "requires focusing the organization, analyzing business cases to determine where machine learning can add value, and managing the risks of a new methodology." As a leader in your organization, it is vital that the machine learning initiative has executive support and endorsement prior to bringing in any proposed solutions and clear communication on goals and expectations. Getting buy in from the departments and teams using the tool is paramount to achieving high performance.

It may be tempting to buy first and ask questions later, but historically this has proven to be a flawed approach. Typically, if leadership brings in a new tool or tactic and mandates company-wide adoption, there is significant pushback and resistance to altering the status quo. The tool goes unused and is seen as yet another failed experiment. Fingers are pointed as leadership blames management, managers in turn accuse their teams of insubordination, and employees lose faith in the leadership's decision making.

In addition to getting the support of the various teams and end users, here are some additional responsibilities of leadership.
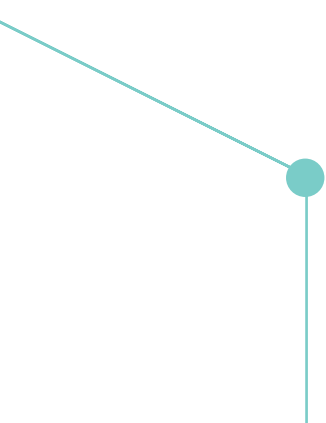
Strategy

McKinsey noted the importance of starting with a comprehensive strategy instead of a "run and gun" approach.
Without strategy as a starting point, machine learning risks becoming a tool buried inside a company's routine operations: it will provide a useful service, but its long-term value will probably be limited to an endless repetition of "cookie cutter" applications such as models for acquiring, stimulating, and retaining customers.

In order to truly reap the benefits of an automated machine learning platform, it is vital that a strategy is in place prior to making the investment. And while it may go without saying, this strategy should not be made in a vacuum. While at first it may be easier to create a plan without involving many different departments and teams, you will find that a comprehensive plan requires input from many different people.

Goals

As powerful as machine learning can be in in the right hands, it can only help solve problems that are clearly defined. It is not a "set it and forget" strategy, but needs to be linked to clear goals and ROI. You need a plan about how you are going to use machine learning to achieve ultra specific goals. These goals will provide the more holistic vision necessary to prioritize and focus on specific use cases that will drive the entire organization forward, instead of getting distracted by the agendas of individual department heads.

Scale

Not only are goals helpful to provide direction, but will help scale AML across the entire organization. It is recommended, especially at first, to start small and identify a specific part of the business you want to work on, and then create specific smaller, correlating projects to work on. With these smaller goals, decide how they will be tracked and what counts as success. For example, while a major business goal may be to increase employee retention, a smaller goal would be to understand the factors that lead to employee churn in a specific department and then scale from there. Starting with small projects is an opportunity to "work out the bugs" and provides a more gradual transition into a full-scale organizational adoption.

Guide/redirect data scientists

Your data scientists are experts at what they do and the value they can bring to your organization is substantial. However, in most cases, they do not possess the same high-level understanding of the business needs and objectives that you and the other leaders do. And just as you lean on them to inform you of the capabilities of machine learning and the complex problems they are working on, you must guide them to ensure their efforts are addressing the correct business initiatives. This guidance becomes especially important when creating and testing the outcome of various "what if" scenarios. Your data scientists cannot be expected to know the many details surrounding even the smallest business decision.

In this case, your analysts become instrumental in marrying the worlds of data and business. They should possess sufficient business and data acumen that with an automated machine learning platform they can build out the necessary models to address specific business needs. (I like how you constantly reinforce the need for analyst involvement)

Challenges to overcome

Finally, it is important to understand the possible challenges your organization will face as it begins to embrace automated machine learning.

Siloed data

One of the biggest problems facing any business bringing in AML is the quality and accessibility of data. Upfront, it is important that leadership set clear expectations about the democratization of data across teams. Siloed data not only sets teams against each other, but also weakens any attempts at using automated machine learning to build useful models as analysts and data scientists may not be aware of what data exists.

Siloed data is also problematic because it increases the likelihood of incomplete data sets or dirty data that needs to be updated prior to leveraging in a machine learning project. If there aren't clearly delineated, company-wide processes around data storage, individual teams and departments are left to their own devices, resulting in a myriad of record keeping methods.

Unclear ownership

Who is in charge of data processing at your company? Who are the stakeholders that determine the level of success from the various machine learning models? As with any business objective, ownership and accountability play an important role in the success of that objective. In some cases, new positions, such as chief data officer, are created specifically to create ownership of data processes and bring in the resources necessary.

Unclear use cases

It isn't uncommon for an organization to make the investment and bring in an automated machine learning tool without first identifying specific use cases they intend to solve, or even first questioning if machine learning is in fact the right tool to address those objectives. Furthermore, as different departments learn that the organization is investing in an automated machine learning platform, they become competitive and each wants access to the tool, creating a "bread line" that could bog down productivity. To prevent this, leadership needs to prioritize use cases and implement processes for model building and deployment.

Inappropriate translation of business question into a machine learning question.

AML typically automates the process training a variety of machine learning algorithms on a given dataset, tuning those algorithms, evaluating their performance, and productionizing the best performing one. Before an AML system takes over the problem, a user must ask the question to be solved and provide a relevant dataset for answering this question using machine learning. A critical factor for success is to ensure we correctly cast the business question of interest in the form of a proper machine learning question.

Conclusion

Management author Ram Charan suggests that "any organization that is not a math house now or is unable to become one soon is already a legacy company. This obviously creates a sense of urgency among forward-thinking business leaders who understand the value of predictive analytics. Automated machine learning can be a powerful asset to your organization. Certainly, there is a learning curve to any new tool and there will be challenges to overcome. But, done correctly it can give your organization the predictive capabilities that will be a major factor of differentiation from your competitors. We are on the brink of the next industrial revolution, and this new technology will render existing tech and processes obsolete.

Early adopters will obviously have a competitive edge as they will have had time to experiment and "work out the bugs" and really create a data-informed organization while those that were hesitant to embrace this new technology will find themselves struggling to remain relevant. Regardless of your industry, you have valuable data that could/ should alter the way you operate.

If you are interested in exploring the incredible potential of automated machine in your organization, Big Squid offers custom solutions for your organization regardless of industry or use case. Our client services team will help you through each step of the implementation process and ensure that your analysts have the training necessary to immediately begin delivering predictive and prescriptive analytics.

bigsquid™
Smarter Decisions. **Faster.**

www.**bigsquid**.com