AppSheet

Why the Future of Machine Learning is No-Code

Table of Contents

Executive Summary

Because of its enormous potential, machine learning is rapidly becoming one of the most in-demand and transformative technologies on the market today. As a result, organizations in all industries are pouring money into machine learning. In fact, research suggests that companies will invest $12.3 billion in machine learning by 2026, up from the $2.5 billion they spent in 2017.

Before that happens, however, there are several hurdles that the technology needs to overcome.

At the highest level of business, machine learning is being used to help enterprises manage, analyze, and otherwise leverage data in ways that were never before possible. Machine learning is being deployed in everything from spam and malware filtering systems to biometric security applications and virtual assistants — and everything in between. While the concept might seem foreign to many, machine learning is already influential in our everyday lives. Netflix's personal movie recommendation engine, for example, is powered by machine learning algorithms.

Machine learning is all around us, running behind the scenes in places like Google Maps, Search and Translate, Uber's route optimization mechanism, and Amazon's recommendation engine. It's become commonly accepted that examples like these are achieved only through large investments and specialized resources.

But beyond technology firms and large enterprises, machine learning is lagging far behind. In large part, this is because the people who know how to use it are hard to hire and expensive. Smaller companies have a tremendous opportunity at hand with machine learning, but it's very difficult for them to actually implement the technology. Machine learning can and should be more accessible to the average company.

A solution exists in no-code development, which has the potential to create a paradigm shift. With no-code, businesses of any size can realize the promise of machine learning.

This approach eliminates the largest barrier to entry — writing code — making it feasible for organizations with smaller budgets and scarce developer resources to use machine learning to innovate and operate more intelligently.

In this white paper, we'll explore:

- The basics of machine learning.

- The tools and technologies that support machine learning.

- The factors that are preventing organizations form leveraging machine learning.

- How no-code can help more companies utilize machine learning.

- Unique advantages that no-code offers in the machine learning space.

Before we get going, let's explore why we're talking about machine learning.

What is Machine Learning?

Machine learning represents a fundamental shift in the way that we approach software development.

Until recently, most computer programs were written via code, a process that involves telling the computer exactly what to do and when to do it in lengthy detail.

Machine learning, however, involves giving the computer examples of what it should do, and the computer learns its behavior from those examples.

In other words, with machine learning it's possible to turn historical data from a mobile app, website, connected sensor, or customer database into actionable insights that can benefit an organization and its customers. And this is just the start of what you can accomplish.

Machine learning doesn't just streamline existing problems. It also allows people to solve different kinds of challenges, unlocking unique and valuable opportunities.

For example, handling unstructured data like speech, natural language text, and multimedia is very difficult to accomplish with traditional coding. But machine learning enables computers to understand and process the kind of data that previously required human intervention.

The term machine learning was originally coined back in 1959. Since then, the concept has been steadily evolving. Today, interest in machine learning is surging due to the massive quantities and types of data that's being harvested, as well as advancements in both data storage and computational processing.

Here are some of the verticals where machine learning stands to make a significant impact in the upcoming years:

Financial Services, for fraud prevention and investment insights.

Government, for law enforcement, utilities, and military/counterterrorism environments.

Retail, for analyzing purchasing trends, tracking marketing campaigns, optimizing pricing and inventory, and gleaning customer insights.

Commercial real estate, for tracking market conditions, analyzing town and property values, predicting when properties will sell, and recognizing buying patterns.

Transportation, for self-driving vehicles, fleet management, and traffic management systems.

Utilities, for energy distribution, discovering energy sources, and anomaly detection.

While it represents tremendous value to these and other verticals, machine learning initiatives require a highly specialized skill set, which is in very short supply.

In the next section, we'll examine why this is the case.

What it Takes to do Machine Learning

There's no shortage of libraries and programs that promise to fast-track machine learning.[1] Despite the abundance of available materials, though, most companies lack the requirements that are needed to get started.

First and foremost, it's not easy to find, retain, and afford the right talent. The average machine learning engineer's salary is now $140,000 per year, according to a recent report.[2] Most organizations can't afford to hire the talent they need to run machine learning projects internally.

1. Nnamdi, Chidume (2019, August 26) *Top 5 Machine Learning Libraries*. Retrieved from https://blog.bitsrc.io/top-5-javascript-machine-learning-libraries-604e52acb548
2. *Machine Learning Engineer salary in USA*. Retrieved November 25, 2019, from https://neuvoo.com/salary/?job=Machine%2BLearning%2BEngineer

Here's a breakdown of some of the additional components you'll need to build effective machine learning models.

Access to the Right Data

Top-tier technology companies have a significant advantage in machine learning because they have large amounts of readily available data, enabling them to solve specific problems. Data is the most important resource in machine learning; you need data to "teach" machine learning algorithms.

At the same time, when these large companies lack certain data sets or technologies for a machine learning project, they typically have the ability to buy smaller organizations that possess the insights they need. For example, Facebook bought AI and machine learning startup Ozlo — a self-described "index of knowledge about the real world" — and integrated the company's machine learning engine directly into its messaging app.

Smaller companies are forced to use their own data or obtain it from a third party. And while the sample size will always be limited, there are ways to address this issue. Building no-code apps, for instance, allows you to collect more data. Techniques like few-shot learning allow no-code platforms to train once on a big model and then fine-tune the results on a smaller dataset.[3]

Interesting Projects

The best and brightest machine learning developers tend to be very selective about where they work and what they are working on. This is due to the fact that machine learning is one of the most competitive disciplines in the world today.

Most machine learning experts enter into the field expecting to work on interesting and pressing projects like self-driving vehicles, disease detection and prevention, cybersecurity, and aerospace engineering — not automating backend business processes.

Companies that lack exciting projects tend to have a hard time recruiting, hiring, and retaining talented machine learning professionals. Those professionals, after all, can pick and choose the projects they work on.

Automation

Even if you do have the resources needed to piece together a well-rounded team of machine learning experts and data scientists, the traditional modeling process — preprocessing, feature engineering, algorithm

---

3. Oreskovic, Alexei (2017, July 31) *Facebook bought an AI startup that could turn its middling virtual assistant into a Siri killer.* Retrieved from https://www.businessinsider.com/facebook-acquires-ozlo-ai-startup-2017-7

diversification and selection, training and refining, compiling, model competitions, insight and analysis, deployment, and management — can take months to complete.

For example, the first step — preprocessing — is a multi-step process in and of itself. It requires importing the correct libraries for a specific program, importing a dataset, locating missing data in the dataset, encoding categorical data, breaking the dataset down into a test and training set, and finally feature scaling, or standardizing the range of independent variables in the data.

And keep in mind that this is just a high-level view of the first step for a single machine learning model.

Due to this complexity, most companies today are using third-party platforms like DataRobot to automate the machine learning process. It's important to remember, though, that even a top-tier machine learning platform will only get you so far. That's because not all machine learning tasks have been automated yet. As such, data scientists still play an important role in the model development process.

A chatbot, for instance, may be able to replicate some features of a customer service agent — but not all of them. So, if you're using an automation platform, you should still bank on a fair amount of human research, iteration, and refining.

Abundant IT Resources

Businesses that move forward with machine learning projects are often surprised to learn about all of the required ancillary processes and responsibilities.

For example, machine learning itself requires vast amounts of scalable storage, constant logging and monitoring, data import and munging, task management, model API management, UI design, visualizations, and security monitoring.

Additionally, machine learning code requires a complex ecosystem of surrounding infrastructure for configuration, feature extraction, data collection and verification, machine resource management, analysis tools, process management tools, serving infrastructure, and monitoring services. The machine learning code is only a small part of a real-world machine learning deployment.
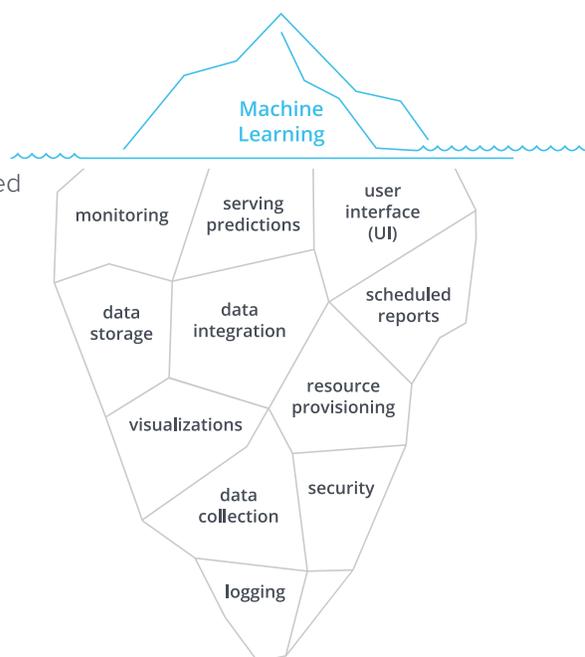
AppSheet maintains that machine learning can and should be easier to access — not just for businesses but for everyday employees who can use it to work smarter and produce better results.

Rethinking Machine Learning

When it boils down to it, machine learning is an umbrella term that describes a long list of diverse projects. Over the next decade, some machine learning models will be used to tackle complex global challenges. But the vast majority will likely be applied to streamlining smaller, more tedious elements of everyday life.

What's needed is a collective refresh on how we think about machine learning.

"[I don't think] that we yet have a settled sense of quite what machine learning means — what it will mean for tech companies or for companies in the broader economy, how to think structurally about what new things it could enable, or what machine learning means for all the rest of us, and what important problems it might actually be able to solve," says venture capitalist Benedict Evans. "This isn't helped by the term *arti icial intelligence*, which tends to end any conversation as soon as it's begun. As soon as we say *AI*, it's as though the black monolith from the beginning of 2001 has appeared and we all become apes screaming at it and shaking our fists. You can't analyze AI."[4]

Evans also touched on a popular misconception about machine learning, which is that it's something anthropomorphic — or equipped with general intelligence.

Machine learning, Evans says, lets us solve classes of problems that computers can't usefully address — and each problem will require "a different implementation, different data, a different route to market, and often, a different company."

He also offers three tips for businesses to keep in mind when approaching machine learning:

- The technology could deliver better results for questions that you're already asking about data.

- Machine learning enables you to ask new questions about your data.

- Machine learning opens new data types for analysis. Computers could not really read audio, images or video before. Now, increasingly, that's possible.

---

4. Evans, Benedict (2018, June 22) *Ways to think about machine learning*. Retrieved from https://www.ben-evans.com/benedictevans/2018/06/22/ways-to-think-about-machine-learning-8nefy

Perhaps the most important point to consider before moving forward, though, is that machine learning can be directly applied to everyday business use cases. Organizations need to break down data into digestible pieces, and start looking for ways of building it into practical applications such as:

- Recognizing patterns in daily workflows.

- Discovering processes that may contribute to turnover.

- Finding new business opportunities.

- Streamlining inventory management.

- Providing equipment maintenance.

How can we go about breaking down machine learning into smaller segments?

To accomplish this, we need to decouple the most complicated and resource-intensive aspect of machine learning from the model development process. And no-code development is a mechanism that can make this possible.

Next, let's explore why the future of machine learning is no-code development.

Why No-code Development will Further Machine Learning

No-code development enables businesses to build applications without writing code. It is faster, easier, and more cost-effective than traditional software development.

As we mentioned, machine learning has gotten easier in recent years thanks to advancements in automated platforms. But there are not a lot of machine learning tools on the market today that can support people who lack the necessary skills.

Consider the fact that machine learning remains in the hands of a small, exclusive group of highly trained individuals — data scientists and software engineers — and out of the hands of a seemingly infinite amount of workers and teams that could benefit from using it. While rank-and-file employees might interact with machine learning in various places throughout the day without even realizing it, the technology remains inaccessible as a tool.

The vast majority of the work that goes into machine learning involves traditional software development. This includes tasks like gathering data, connecting components together, debugging, figuring out how to integrate models into apps, and so on. The work is not glamorous, and most of it can be automated by a no-code platform like AppSheet.

Combining a no-code platform with machine learning makes machine learning accessible to the same extent as any other business productivity tool. As a result, instead of focusing all of their time on backend coding, data scientists can focus more on the larger scope of a project — opening the door to enhanced creativity, stronger results, and critical advancements in automation.

At the same time, front-line employees are able to engage in the machine learning development process, integrating models directly into applications without having to understand coding.

Imagine a future where machine learning is widely deployed and easily accessible to everyone regardless of their technical background. That's an era we're aiming to help usher in at AppSheet.

What No-Code Machine Learning can Accomplish

A no-code machine learning platform can help a company in two different ways.

The first benefit that a no-code platform can deliver is derived from the intelligence of the platform itself. In other words, the platform can glean vast amounts of insight from the thousands of apps that it has already seen.

For example, an app could use no-code machine learning to study customer transactions. The findings can then be used to determine what a customer may want to buy next — based on their own preferences and the preferences of customers like them.

Second, the platform makes it possible to integrate machine learning into apps that creators build.
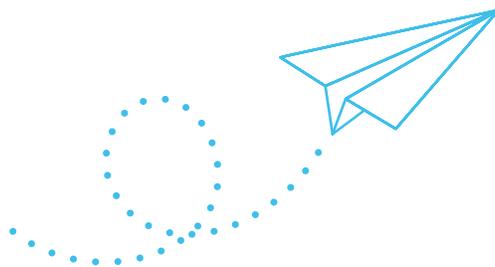
Here are some practical examples:

1. Customer Churn
Customer churn is a major issue for businesses today, especially for SaaS companies.

For instance, think of a company with 1,000 customers and a 5 percent monthly churn rate. Over the course of a year, that translates to 460 lost customers — which is a significant loss. To stay profitable, companies need to keep churn rates at a manageable level.

Companies can use machine learning to analyze logs of users who have churned in the past and predict which users may churn in the future. Based on that information, organizations can develop plans for how to keep that customer segment happy and engaged.

2. Demand Forecasting
Demand forecasting is one of the most important tasks for a growing business. While a forecast is never entirely accurate, businesses should strive to get as close as possible.

With no-code machine learning, you can create a solution that combines logs of customer transactions over time to more accurately predict the volume of transactions in the future.

3. Invoice Extraction
Invoices need to be carefully managed and analyzed over time to recognize spending patterns and avoid wasteful processes.

Using no-code machine learning, historical records of invoices, transcribed invoice numbers, and data that represents total money spent can predict new, accurate invoices.

4. Support Ticket Routing
Companies are putting a premium on the customer experience (CX) today. In fact, CX is rapidly becoming a key competitive differentiator.[5] Yet solving customer issues remains a problem for many companies due to backend inefficiencies.

By building machine learning into a no-code app, a business can identify customer issues — including who they were assigned to and when. This data can then be used to determine who should handle certain issues moving forward.

_____

5. Wladawsky-Berger, Irving (2018, April 20) *Customer Experience Is the Key Competitive Differentiator in the Digital Age*. Retrieved from https://blogs.wsj.com/cio/2018/04/20/customer-experience-is-the-key-competitive-differentiator-in-the-digital-age/

5. IIoT Anomality Detection

An increasing number of manufacturing companies are integrating industrial internet of things (IIoT) solutions into their plants, facilities, and warehouses. These devices, however, have to be monitored for performance and anomalies.

An app with built-in machine learning can be used to log vibration measurements from a factory machine and predict future breakdowns — which can inform technicians as to which machinery and equipment needs preventative maintenance.

Of course, there are many available off-the-shelf apps that can solve these types of challenges. These are just some examples of what you can accomplish with no-code machine learning. The real advantage to using a no-code tool is that you can apply machine learning to new challenges that haven't yet been solved.

Now that we've identified some potential use cases for no-code machine learning apps, let's take a closer look at five unique advantages of no-code machine learning.

Five Advantages of No-code Machine Learning

1. Machine learning is a natrual extension of no-code development

No-code platforms already handle much of the heavy lifting that's necessary for implementing a machine learning project, apart from machine learning. Much of this takes place in the background.

As a result, it should be much easier for a true no-code platform to introduce machine learning features.

2. No-code machine learning puts subject matter experts in control

Ideally, people who are most familiar with data should be the ones deploying machine learning on a daily basis. This is not the case right now. But with a no-code approach, it could be.

It's a major advantage to have line-of-business people building apps. It would also be beneficial to have them building machine learning models because these people deeply understand the data, where it came from, and what it means.

Most machine learning experts would agree: The easiest path to success is being able to look at your data and thoroughly understand it.

Ultimately, each machine learning-powered app built on a no-code platform is like a small experiment that can provide a better understanding of what works and what doesn't.

3. A no-code platform can help create a useful machine learning model

The no-code platform itself can automatically identify when machine learning is applicable.

For example, if you've already built an app on AppSheet, then the platform understands your data model — the relevant entities, their relationships, their attributes, and so on.

Because the platform has collectively seen millions of different apps and knows when machine learning has been successfully used in those apps, it can figure out the right way to use it in your app.

Just like a platform can guide people to create a better-looking app, it can also guide people to create a useful machine learning model.

4. The more people that use machine learning on a no-code platform, the better the platform gets at applying machine learning

As a platform like AppSheet continues to process similar solutions like customer churn apps, the system can learn to identify correlating patterns and trends. In other words, it can learn what a good customer churn model looks like.

5. It can turn business experts into data experts

You don't need to be a data scientist to do machine learning. Rather, you just need to understand your business.

Once you have enough data, you can start to use machine learning to unlock new value in that data.

The new value can be seen in things like:

- Insights into patterns and trends (e.g., analytics).
- New featues in the app itself (e.g., automatically filling out a form using OCR).
- New ways of interacting with your data (e.g., Siri-like speech interfaces).

The above illustrates just some of the benefits no-code and machine learning can bring to organizations like yours.

Machine Learning + No-code: The Perfect Match

Machine learning promises to transform the way we do business, accelerating the decision-making process and helping us discover the powerful insights that are hidden in our data.

But for many organizations, machine learning is largely seen as something that's out of reach due to the traditional costs associated with such initiatives.

Thanks to no-code development, however, machine learning is increasingly accessible to organizations big and small.

With a no-code platform in place, teams — regardless of their technological prowess — can build robust applications that are driven by machine learning algorithms. And that's the ticket to increased productivity, happier employees and customers, and a healthier bottom line.

Next, let's examine AppSheet's approach to machine learning.

Machine Learning: The AppSheet Way

AppSheet is enabling no-code machine learning through two specific initiatives:

The AppSheet Intelligent Platform: The Intelligent Platform project — which is being continuously enhanced and improved — is making custom software accessible to more people. The goal of this platform is to make no-code app design accessible to anyone. The Intelligent Platform empowers most employees to create custom software, not just tech-savvy business users.

The goal of the Intelligent Platform project is to foster an environment where someone can build apps based solely on the concepts that matter to them, without having to understand any underlying code.

- Before the advent of no-code, developers had to understand how to string together complex lines of code.

- Today, the Intelligent Platform is at a point where app builders no longer write code. However, they still require some underlying technical knowledge related to building apps (like spreadsheets, tables, schemas, workflow rules, columns, and validation rules).

- Looking forward, it will be possible to design apps purely with an understanding of everyday business concepts, having no coding or platform knowledge.

No-code Machine Learning: This project is empowering app creators to create sophisticated, intelligent apps by making the latest advancements in machine learning and artificial intelligence accessible in a no-code manner.

Remember, building a machine learning-powered app involves combining machine learning technology with the entire software stack. For this reason, there is a tremendous amount of backend work that is required to make machine learning possible, including resource provisioning, data storage, collection, and integration, monitoring, user interface, reporting, security, logging, visualizations, and serving predictions.

All of these services are embedded directly into AppSheet's Intelligent Platform, enabling a business to leverage them without having to invest in each individual process.
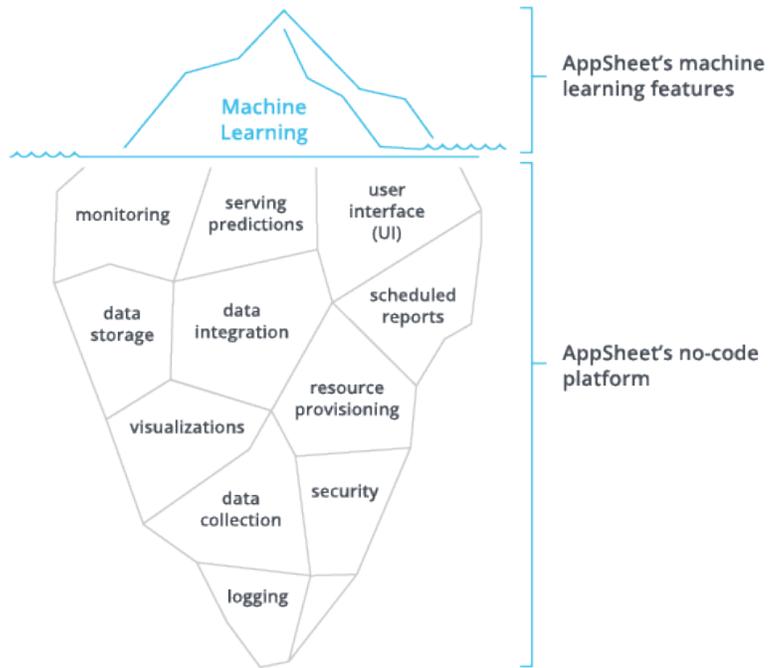
As you can see, no-code machine learning can allow a business to engage in machine learning in a way that is completely streamlined, and highly resource-efficient. AppSheet provides automated machine learning capabilities with push-button ease, allowing machine learning to be seamlessly integrated into any app.

For more information on AppSheet's intelligence capabilities, go to: www.appsheet.com/create/intelligence

The Next Step: Design the App

If you haven't tried using a no-code platform yet, we invite you to start building your own app today.

Once you see how easy it is to iterate without any coding, you'll be able to visualize all the ways that you can integrate machine learning into your processes and workflows to make better decisions and figure out the best way forward.

About AppSheet

The AppSheet intelligent no-code app development platform empowers business users to create and deploy robust apps tightly connected to existing business data. Unique machine learning and AI-forward functionality further simplifies app creation and enriches the end-user experience. While enabling rapid innovation and citizen development, the platform also ensures apps meet IT governance, security, and management requirements. Thousands of enterprises across the globe use AppSheet to address departmental, line of business, or company-wide digital transformation initiatives. Headquartered in Seattle, AppSheet's mission is to disrupt the world of low-code app development. For more information, please visit www.appsheet.com.