PUTTING MACHINE LEARNING TO WORK FOR YOUR COMPANY

A paper by

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It's time. Your company has done everything it can to grow, but you've come up against a roadblock. Not only has the amount of data required for your digital acceleration grown beyond your current tools, but your staff also isn't capable of tackling the deluge of information that continually pumps through your pipeline. Your customer base is exploding and demand is at an all-time high. It seems you still feel as though you're only just treading water no matter how many new employees you bring into the mix.

All the while, your competition is crushing it. Somehow they're gaining ground and customer satisfaction you can't seem to touch. What gives?

It could very well be that your competitors have implemented machine learning into their systems. That kind of edge is exactly what modern business requires to keep up with ever-growing demand, as well as to predict future trends to know exactly how and when a pivot might be necessary.

If you're not already considering machine learning, you're already behind the curve. But fear not, this leading technology isn't an impossibility. In fact, you're probably closer than you think to putting machine learning to work for your company.

Let's break it down a bit.

WHAT IS MACHINE LEARNING?

First, let's figure out what machine learning is. Before your brain conjures up images of the singularity—where technological growth, spawned by robots, becomes uncontrollable and irreversible, resulting in unforeseeable changes to human civilization—know that we're talking about something very different.

Advantages and Disadvantages of machine learning

Easily identifies trends and patterns

Requires massive data sets

No human intervention needed

Needs high computing resources

Continuous improvement

Interpretation of results can be challenging

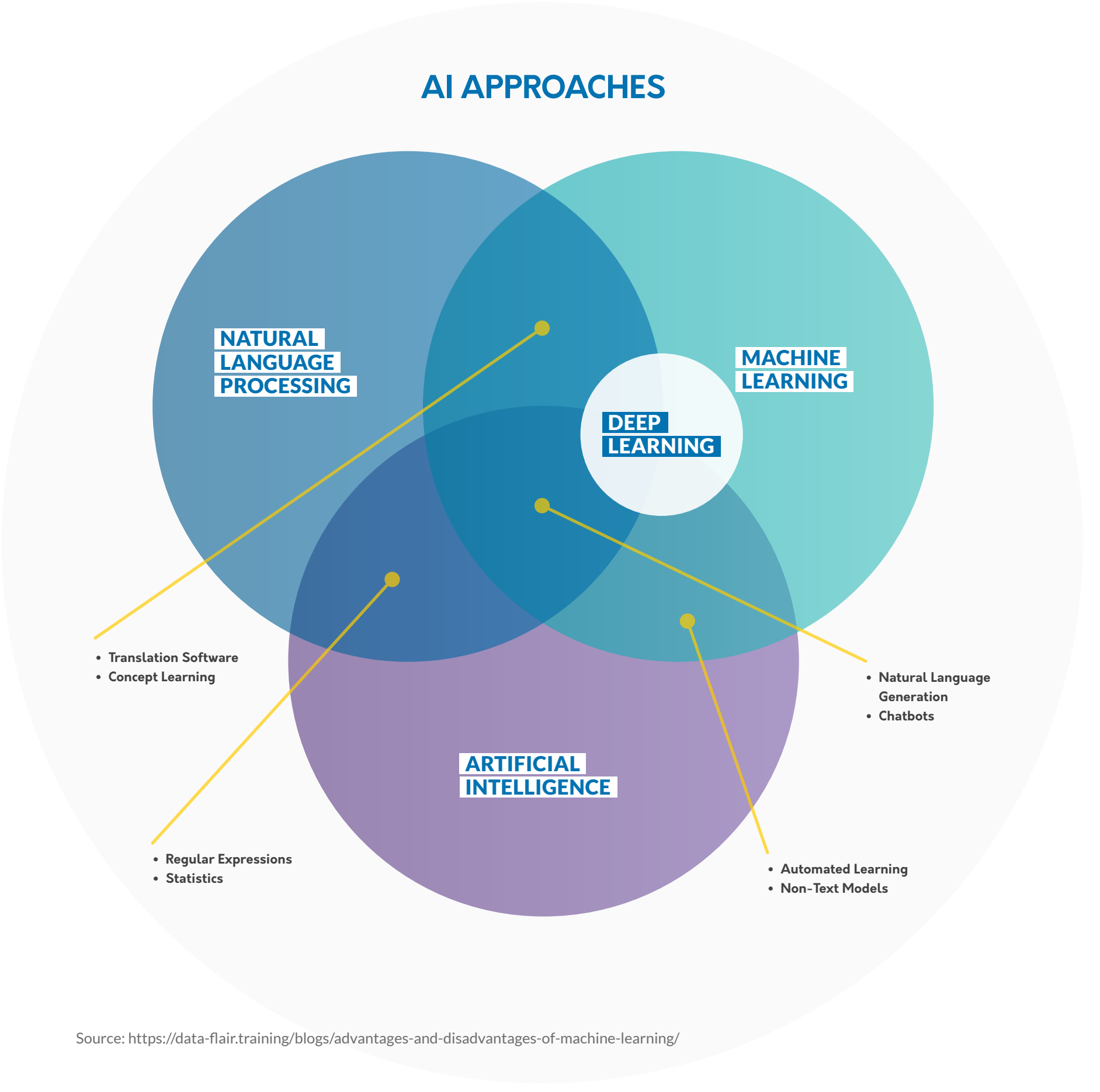
Handles multi-dimensional and multi-variety data

High error susceptibility

Source: https://data-flair.training/blogs/advantages-and-disadvantages-of-machine-learning/

Machine learning is a subset of artificial intelligence where businesses and data scientists study and develop computer algorithms that improve automatically through experience and by the use of data. To simplify that: it's all about algorithms that are capable of learning as they work with data. It would be the software equivalent of a human going to school and learning a subject. The more the human reads up on the subject, the more it learns.

Machine learning takes the same approach, only the data (information) is being fed to an algorithm and not a human being. The more data that is fed into the algorithm, the smarter the algorithm becomes.



Source: https://data-flair.training/blogs/advantages-and-disadvantages-of-machine-learning/

Think of it this way. You create an algorithm that guesses what products are best suited for specific users. The second the algorithm is complete, it doesn't really know much about your customers or their needs. But then you start feeding that algorithm data you've collected from your customers. The more data your new algorithm consumes, the more capable it will be to predict what customers will want.

As your new algorithm grows and becomes smarter, your developers can continue to tweak it such that it is capable of making even smarter predictions.

That is only part of why your company needs machine learning.

WHY YOUR COMPANY NEEDS MACHINE LEARNING

The benefits of machine learning don't stop at smarter algorithms, although the more learned your software is, the better it will serve you on every conceivable level. Let's take a look at 8 reasons why your company should be implementing machine learning.

1 Personalizing Customer Service

This should be right at the top of your list. Your customers are your business' lifeblood, without which you wouldn't just not grow, you might not even exist. To that end, you must do everything you can to customize the experience they receive.

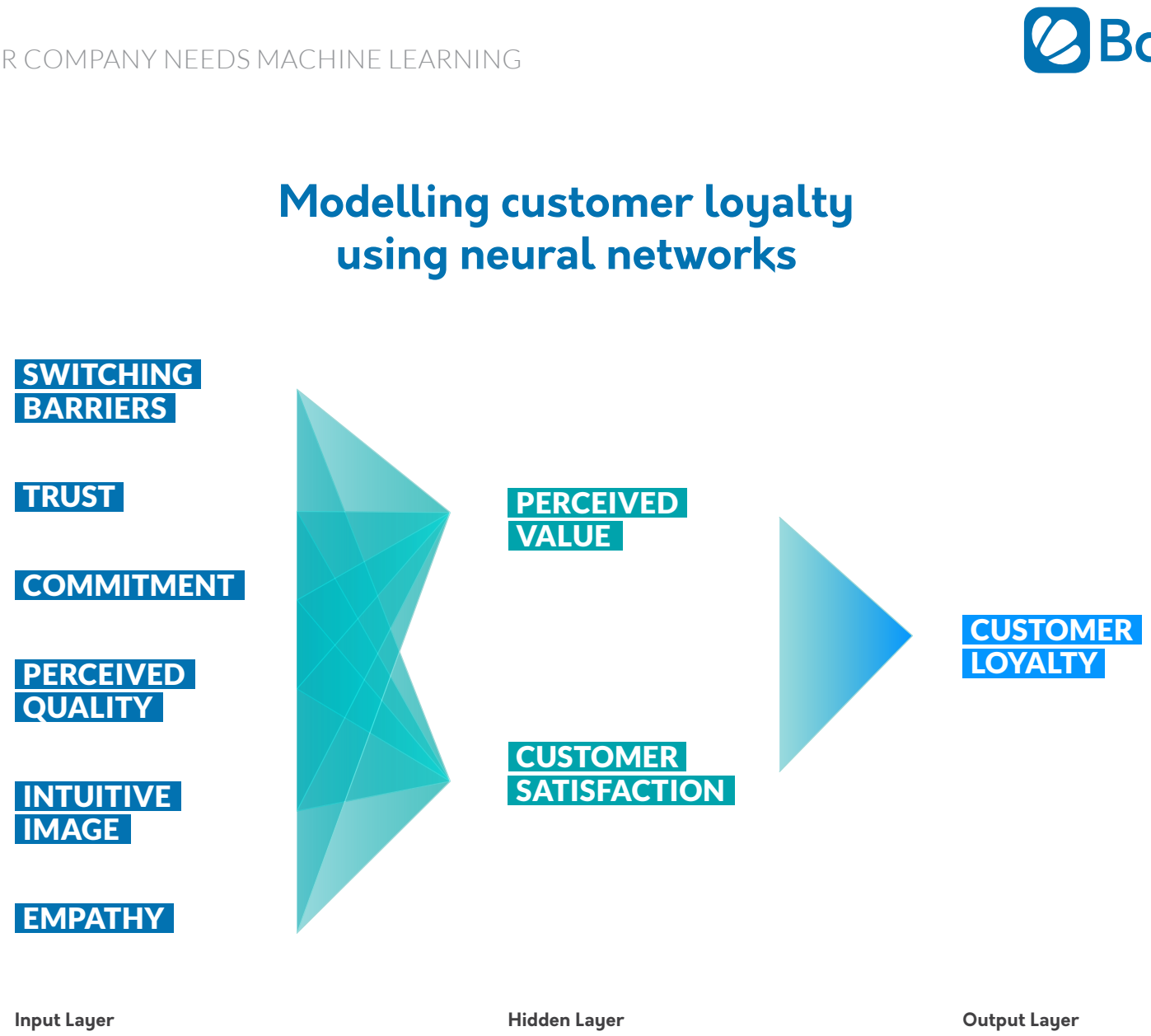
We've reached a tipping point, where a positive experience can make the difference between a customer leaving your business and remaining loyal. Machine learning is a great tool to vastly improve that experience in ways you couldn't possibly manage manually. Not only can machine learning plow through massive troves of data faster, but it can also pick out select items and learn from them.

Because of this, machine learning will also save your company money. In the time it takes an algorithm to learn what is necessary to improve the customer experience and implement those changes, your staff would hardly have gotten started combing through the data. That level of efficiency is unmatched. And, in the end, your customers will feel as though you've been paying attention and understand their needs.

2 Improving Customer Loyalty

Once you've improved the customer service experience, you'll find that customer loyalty will grow exponentially. That customer experience improvement might include being able to predict what a customer will purchase next and be able to automatically present them with that product on their next visit. Or you could offer a customer a discount when it seems they are hesitant to push the Buy button.

Those additions will certainly go a long way to improving customer loyalty. And the more you can improve customer loyalty, you'll find those loyal customers will refer your business to other customers. This is a win-win proposition all around.



Source: https://www.sciencedirect.com/science/article/pii/S2314721016300019

3 Hiring the right team members

Machine learning isn't just about customers. If that were the case, the benefits might not outweigh the barriers to entry for this technology. One area where machine learning will benefit your business is in the hiring process.

Consider this: You're hiring for a position and you get hundreds or thousands of applicants for that job. How do you best narrow down the selection? You could go the old school route and comb through resumes and then start the interview process. But interviewing hundreds or thousands of possible employees is time-consuming.

Now, imagine you've developed an algorithm that will read through the data from prospective employees and be able to immediately tell you which of those candidates are best suited for the job. That would drastically cut down the time you spend in weeding out those who aren't suited for the job. Saving time equates to saving money. And, in this case, you probably want to make sure to hire the right team members on the first go and do it quickly.

4 Finance Automation

Accountants are great, and without them, your company would be in big trouble. But a team of accountants can't possibly do everything you need in an acceptable time frame, especially as your company continues to grow. Consider this: You get an order through your website, but somehow the order number is lost in the process. At that point, someone is going to have to comb through every order (within a certain timeframe) to locate the one with the missing information.

If you have hundreds or thousands orders per day, that could be an overwhelming task.

If you were to implement finance automation, that process could happen almost immediately. Once you've added automation into the finance mix through a ML-powered algorithm, you'll find so much of your delivery pipeline runs far smoother and more reliably.

5 Brand Exposure Metrics

Marketing in today's world is next to impossible. Not only do you have a never-ending feed of social media, but you also have a saturated market without an equal amount of growth in the customer space. Because of this, your business needs every leg up on marketing it can get. One way to help improve your marketing efforts is to know how best to expose your brand to the public. Why not take advantage of the speed and intelligence of machine learning for this process as well?

But that's not all. With the help of machine learning, you can also create applications that will recognize brand exposure in various media formats. With that information, you are better poised to know how to follow those trends to help put your brand front and center.

6 Fraud Detection

Fraud is rampant in businesses everywhere and cuts into the bottom line quickly. This is another area where machine learning vastly outperforms the human equivalent. Your business collects a massive amount of data, some of which might point to fraud. To make fraud detection a challenge, sometimes you have to be able to piece together specific data points that might lead you to spot where fraud is occurring.

Guess what? Machine learning can take care of that much faster and with considerably more reliability. These ML algorithms can be created to instantly spot fraudulent transactions from multiple entry points in your data.

7 Predictive Maintenance

How do you keep track of when your machines need maintenance? Are you still using the old spreadsheet or Wiki to keep track of that information? What happens when you have hundreds or thousands of machines, none of which are on the same maintenance schedule? If you miss out on a maintenance cycle, you could wind up with a loader, printer, computer, autonomous vehicle, or forklift that goes down. When those machines aren't working, it costs you money.

Machine learning can help you predict when those machines will need maintenance. With the right sensors in your equipment, you could have algorithms detect when an engine is running too hot or not efficiently enough. That, in turn, could lead to predictive maintenance which will prevent you from suffering from significant downtime.

8 Improved Supply Chains

You can’t have a supply chain that is too efficient. You also can't rely on humans to dig deep enough into the minutia of how your supply chain is performing. Algorithms can analyze logistics data and cost-effectiveness to help you improve your supply chains from every conceivable level. On top of this, you can use ML algorithms to scan social media and news to discover issues that might impact your supply chain and alert you to those issues. With that information in hand, you can quickly pivot and locate a replacement supplier. Disaster averted.

THE TOOLS NECESSARY TO IMPLEMENT MACHINE LEARNING

Now that you understand how machine learning can benefit your company, it's time to find out what tools you'll need to implement ML into your systems. Fortunately, the biggest investment will be the cost of software engineers who can build the algorithms and work them into your existing systems.

Before you hire that new ML-centric team, here are the frameworks, and tools you'll need to employ.

Scikit-learn is the machine learning framework for Python and provides a number of supervised and unsupervised algorithms. Scikit-learn is built on SciPy and includes the following tools in the stack:

- NumPy: The base n-dimensional array package
- SciPy: A fundamental library for scientific computing
- Matplotlib: Comprehensive 2D/3D plotting
- IPython: An enhanced interactive console
- Sympy: Symbolic mathematics
- Pandas: Data structures and analysis

PyTorch was created by Facebook's AI team and is used for applications such as computer vision and natural language processing. PyTorch specializes in tensor computations, automatic differentiation, and GPU acceleration, which makes it one of the most popular deep learning packages on the market.

TensorFlow is an open-source library focused on the training and inference of deep neural networks and is a symbolic math library based on data flow and differentiable programming. This particular library is widely used for machine learning at scale. TensorFlow is capable of training and running deep neural networks for:

- Handwritten digit classification
- Image recognition
- Word embeddings
- Recurrent neural networks
- Sequence-to-sequence models for machine translation
- Natural language processing
- Partial Differential Equation-based simulations.

Weka is a collection of machine learning algorithms designed to be used with Java and intended for data mining. It also contains tools for data preparation, classification, regression, clustering, association rules mining, and visualization.

Although not directly responsible for machine learning, **KNIME** (aka the Konstanz Information Miner) is an open-source data analytics, reporting, and integration platform. With this tool, you can integrate it into your machine learning platform to mine, analyze, and report data.

Colab was built by Google Research to write and execute arbitrary Python code through a web browser. Colab is quite adept with machine learning, data analysis, and education. It's a free Jupyter Notebook environment that seamlessly integrates with PyTorch, TensorFlow, Keras, and OpenCV.

THE LANGUAGES REQUIRED FOR MACHINE LEARNING

Now that you understand some of the frameworks and libraries you might need for machine learning, let's take a look at the most important languages used for this technology.

Python is one of the most widely used languages for machine learning. Because Python has so many libraries for data science, AI, and web development, it's a perfect match for ML. Python also benefits from being one of the easiest languages to learn. Because Python is considered ideal for prototyping, scientific computing, sentiment analysis, natural language processing, and data science it has plenty to offer for machine learning development.

Both **JavaScript and Java** have plenty of libraries and frameworks perfectly suited for machine learning and have been widely implemented for fraud detection, cyberattacks, and improved network security.

Julia is especially suited for effective model analytics required for developing machine learning applications. Another reason Julia is so popular among the machine learning crowd is its natural ability to handle computational statistics and numerical calculations.

Scala is capable of working with huge databases and can manage massive data flows. Scala also is a great solution for developing, designing, and deploying machine learning algorithms, thanks to its ability to leverage Spark competencies as well as other tools designed specifically for big data.

Both **C and C++** benefit from strong interaction with TensorFlow and Torch, both of which are crucial for the development of machine learning algorithms and applications. On top of this, both of these languages are incredibly fast and offer powerful memory management tools.

BEST PRACTICES FOR PUTTING MACHINE LEARNING TO WORK

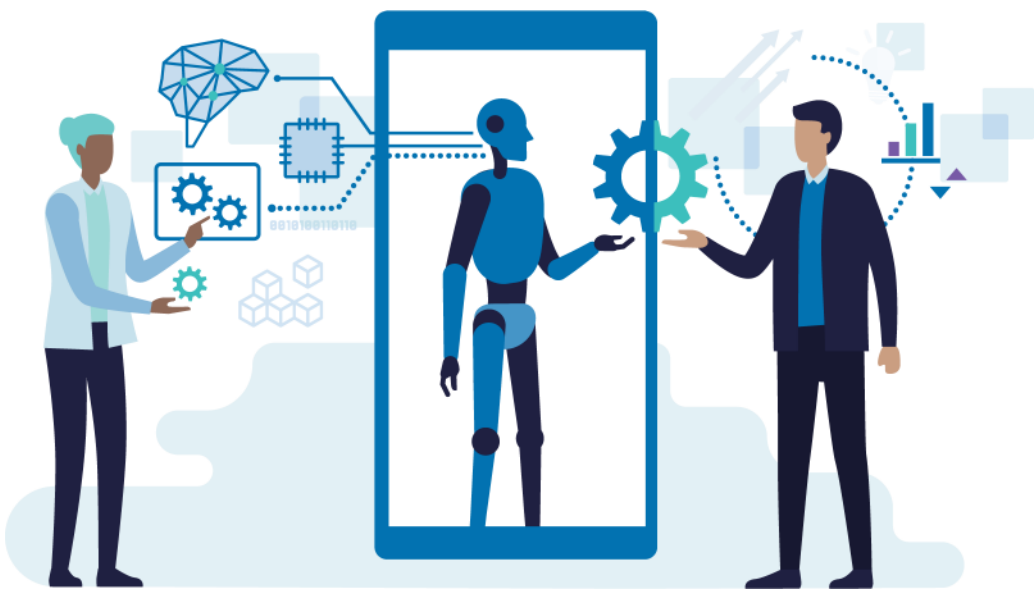
Once you've put together all the pieces, you're going to want to make sure you follow best practices for putting machine learning to work. Some of these best practices include the following.

Define Your Project

Before your developers write that first line of code, you need to clearly define what your project is. Make sure to clearly lay out the goals, risks, and opportunities associated with the project. Be certain to know what team members will play specific roles and how they fit into the process. You need to know what problem this project will solve and how the results of the project will be put to use.

Bring In Many Stakeholders

Don't assume you only need to employ your developers for this machine learning project. You need to add members to your team from departments across the board, such as those from data analysis, marketing, sales, DevOps, management, UI/UX, testing, CIOs, CTOs, COOs, and CFOs. The more stakeholders you add to the project, the better prepared for success it'll be.



Gather Your Data Early On

Do not go into this project without knowing where your data is coming from, what that data will include, how it will integrate into the system, and how to share the required data with your team. This should be one of the first steps you take in the process.

Be Flexible

One of the things about machine learning is that it mutates. The project you end up with might not be the same one you started out researching. Be willing to be flexible. You might find an evolution of the project that might make it more viable for your company along the way. Go with that flow or you might find yourself getting frustrated when trying to bend the project to your immovable will.

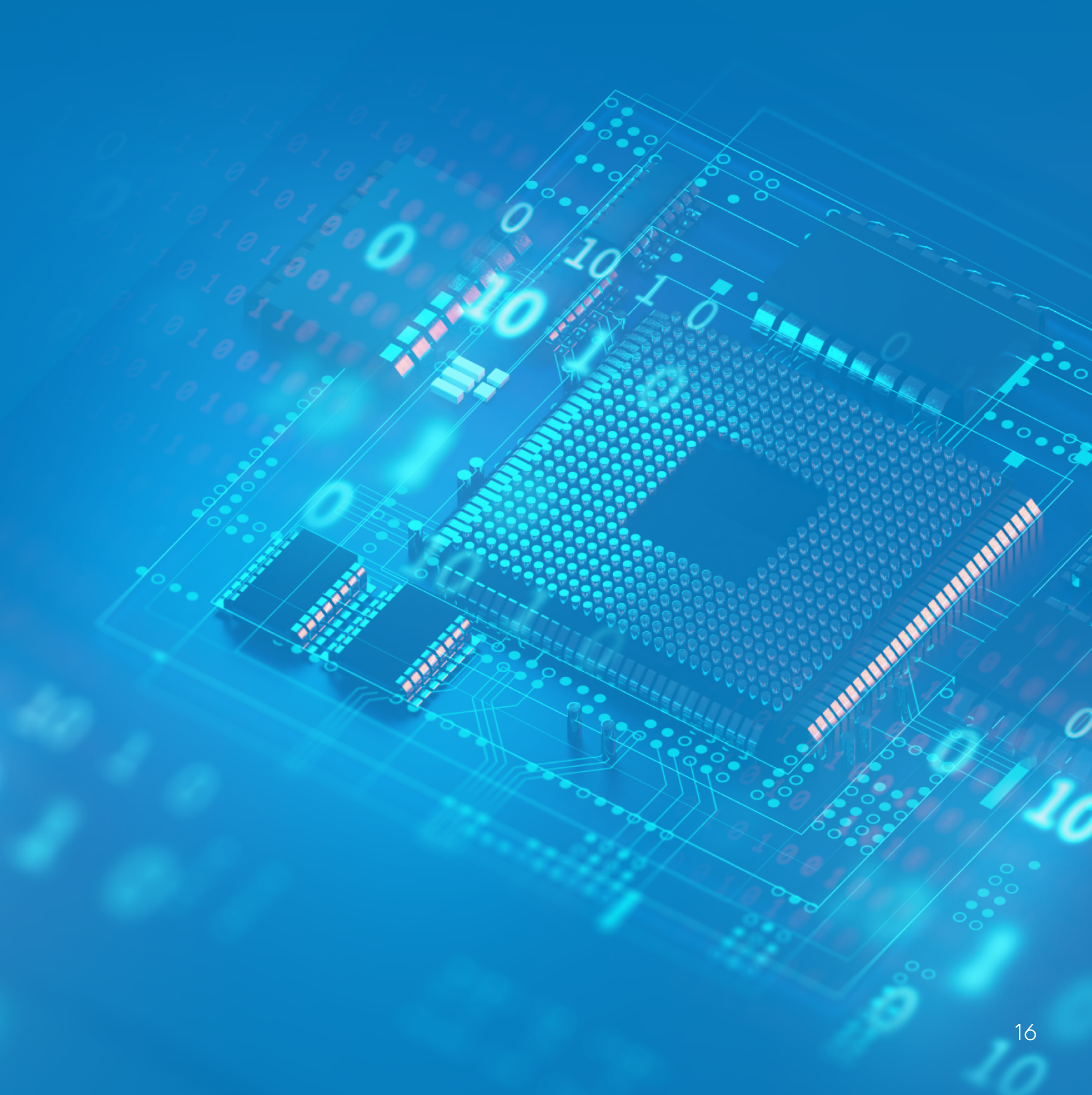
Be Ready to do More

You might think you have everything mapped out from the beginning. You know how many developers you need, how much data is required, what hardware will be involved, and even how much time it'll take until launch.

All of that will change. In fact, you'll realize you've got to do considerably more than you originally thought at some point in the development process. Be willing to go that extra mile. Machine learning is not an easy piece of technology to fit into your current pipeline. The end results, however, will be worth the added effort.

CONCLUSION

This isn’t going to be a particularly easy journey for your company. You'll fail at first, but eventually, you'll get the hang of how machine learning works and how much it can do for your company. At this point in the game, you can’t afford to ignore machine learning. If you have any desire to keep up with the competition, it's time you start working toward putting machine learning to work for your company.



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Using our tech expertise and cross-industry experience, we evolve digital transformation into digital acceleration. Our ultimate goal is to create lasting value throughout the entire digital transformation journey.

With 3,000+ seasoned engineers in 36 countries, we provide time zone aligned services to empower Fortune 500 companies and leading brands. Working for clients like Google, Rolls-Royce, Johnson & Johnson, Pinterest, and ViacomCBS, we've been reimagining the tech landscape for over a decade.

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