Machine Learning

What You Need to Know Now
The science of machine learning is maturing as more and more industries use this form of artificial intelligence for everything from customized product marketing and entertainment offerings to high-speed financial transactions, precision medicine, and more. Manufacturers are leveraging it to improve efficiency, quality, and sustainability.

Despite its widespread and growing use, many are confused about machine learning and its relationship to artificial intelligence. Others wonder how to harness the value of machine learning with limited budgets and a lack of staff experience.

Let’s start with a clarifying definition. Machine learning refers to a specific subset of artificial intelligence, which uses data to teach computers new skills. At its core, machine learning involves fine-tuning statistical models while iterating through large datasets (extremely large in many cases!). The model improves with each new data point, allowing the
computer to make more accurate predictions for subsequent data points. This learning process, based on algorithms, is best suited for:

- Categorizing people or things
- Predicting likely outcomes
- Identifying new patterns
- Detecting unexpected behaviors

While not the only way to teach new tasks to a computer, machine learning is becoming increasingly common in our age of big data. Consumer expectations—better, faster, and cheaper—also are creating pressure for companies to adopt machine learning or risk obsolescence as others use it to competitive advantage. But just like the adage: “Garbage In, Garbage Out,” a machine learning outcome is entirely dependent on the quality of the data it is given.

Successful machine learning happens when the right questions are asked – and answered – in advance. Without proper planning, failure is practically guaranteed. In fact, recent research found that close to 85 percent of AI projects fail to deliver on their promises.

This Intertech Executive Brief will highlight some prominent industries effectively using machine learning today, along with some guidelines for evaluating the potential usefulness of machine learning in your organization.
Financial Services

*Have you heard of COIN (Contract Intelligence)?* It’s a machine learning program used by JP Morgan to scan and analyze commercial credit agreements and other documents. COIN is nothing short of miraculous, completing 360,000 hours of human work in seconds. That’s just one example of how machine learning is turning the financial services industry upside down. The availability of vast amounts of data combined with more affordable computing power is driving this trend.

**Executive Insight**

From money laundering prevention, fraud detection, and automated trading systems that run entirely without human intervention, to improved risk management and better chatbot experiences, financial institutions around the world are investing billions into finding ways to use machine learning. Benefits include increased profit through reduced operational costs, increased revenues, increased customer loyalty due to better customer experiences, and better compliance and risk management.

**Additional Consideration**

The use of machine learning in the financial world also involves risk. A recent report by the World Economic Forum, *The Physics of Financial Services – How artificial intelligence is transforming the* 

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financial ecosystem, warns that as big players adopt AI and machine learning applications, they are creating a “self-driving AI finance world.” The report also expresses concern that this new financial world will be “centralized with only a few networked players.”
Studies have shown machine learning to be 72 percent accurate in diagnosing breast cancer from a mammogram. Physicians are about 65 percent accurate. Machine learning in healthcare is not only saving lives and reducing costs; it’s helping to relieve administrative burdens on stressed-out care providers. A recent example: Quotient Health used machine learning to develop software that reduces the cost of supporting electronic medical records by optimizing and standardizing system design.

Executive Insight

Machine learning is helping pathologists make quicker and more accurate diagnoses. Beyond diagnosis, machine learning is leading to more effective treatments:

- **Microsoft’s Project InnerEye** can differentiate between healthy anatomy and tumors by using 3D radiological images.

- **Pfizer is using machine learning** for immune-oncology research into how the body’s immune system can fight cancer.

- **Concerto Health AI uses machine learning** to analyze oncology data. This is providing insights necessary for precision medicine and more promising recovery results.
Additional Consideration

One of the biggest challenges facing new machine learning initiatives is high cost, often due to false starts and missed attempts. Additionally, hiring AI and data experts is expensive. This will slowly begin to change as professionals gain experience in this field, and more technology becomes open-sourced, leading to faster time to market for end applications. In areas like healthcare, where skyrocketing costs are a significant challenge, this is good news.
Nearly one-third of all mortgage lenders are using some form of machine learning or artificial intelligence to assist with mortgage originations. Research by U.S. mortgage giant Fannie Mae has found that lenders are using machine learning to fight fraud and connect borrowers with the most suitable lenders faster and more efficiently.

Realize Cost Savings

Lenders also are using machine learning to reduce the time and complexity involved in the mortgage approval process. What used to take weeks or months can now be done in under ten minutes thanks to automated approval processes. Equally impressive is the cost savings that automation makes possible. One Silicon Valley startup, Lenda, reports saving their average customer $48,000 on fees and interest compared to those using traditional mortgage lenders.

Executive Insight

Experts believe the use of machine learning in the mortgage industry is in its infancy. Expect to see even more impressive improvements as organizations develop increasingly sophisticated algorithms. Consumers will benefit from more precise methods for determining creditworthiness, especially young people and those without a traditional credit history. Machine learning already is mining more data, such as social media history, to determine creditworthiness.
Additional Consideration

Ultimately, much of the work of machine learning will happen in the cloud. With their ability to provision, maintain, optimize, and upgrade hardware reliably, cloud providers will be the obvious choice for anyone building a serious machine learning application. Another plus: competition among cloud providers will drive costs lower.
Manufacturing

**AI and machine learning adoption in manufacturing are predicted to eclipse robotics over the next five years.**

Today, machine learning is helping manufacturers solve tough problems and reveal others, such as hidden bottlenecks or unprofitable production lines. And manufacturers are learning ways to increase sustainability by using machine learning and predictive analytics that scale on cloud platforms.

**Executive Insight**

One of our clients is using computer vision to identify electronic components to enable their customers to order replacement parts. Intertech consultants are training machine learning models on millions of images to identify the various components accurately. **This is just one example of the transformative power of machine learning in a manufacturing setting.**

**Additional Consideration**

By using machine learning to uncover defects and build in more effective quality assurance, manufacturers have the potential to increase their productivity and profits dramatically. Manufacturers with heavy equipment, including large-scale machinery, also are exploring the use of algorithms to improve throughput, sustainability, and yield rates.
Ever look at a product online and then, sometimes in a matter of minutes, receive online ads for that very product? Machine learning, no doubt, played a role by learning about your consumer behavior and individual preferences. While some find this experience unnerving, retailers are using it to predict and encourage purchases.

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Here’s a short list of how machine learning is transforming the world of retail:

- Offering customers personalized product recommendations
- Offering special prices in real-time to boost sales
- Providing better inventory planning
- Offering faster and more efficient deliveries
- Providing more accurate sales predictions
- Perfecting app user experience and optimizing website content
- Enabling better customer segmentation based on previous behavior

Additional Consideration
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If you're paying attention, you're noticing examples of machine learning in retail action everywhere. The big guys – Walmart, Amazon, Target, among others – are perfecting the art of using machine learning to get up close and personal with customers. They’re also using it to detect fraudulent activities, map better delivery routes, and offer faster checkout.
“Make ‘em laugh, make ‘em laugh. Don’t ya know that the whole world wants to laugh?”
— Singing in the Rain (1952)

Making people laugh at the movies was a no brainer during the feel-good 1950s. Things are a lot more complicated today. The cost of making a major motion picture is enormous.

Know Your Audience

Predicting success before millions of dollars are dedicated to creating an entertainment product is a rich area for machine learning. From analyzing data to predicting who will watch a film or play a game to forecasting box office revenues to categorizing millions of photos on Yelp, entertainment companies are using machine learning like never before to learn what options are most preferred.

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Use due diligence to discern in advance whether your model can be put into operational practice. Case in point: Netflix created the Netflix Prize challenging data scientists to develop a highly performing model to predict what customers want to watch. The winning model astounded Netflix executives by predicting user preferences at unprecedented levels. Just one problem. It could not execute in real-time, which—as anyone who has hot popcorn at the ready knows—is when it actually matters.
Most new machine learning applications face difficulties at deployment time. And successfully scaling machine learning models to thousands or millions of users introduces other significant challenges. Mammoth companies like Google, Netflix, and Amazon have the resources for solving deployment challenges. Smaller companies face more difficulty operationalizing their machine learning models. Machine learning models and data pipelines are inherently complex. Don’t be afraid to ask for help with implementation.
Conclusion

Machine learning is leading us toward new frontiers in many industries. Yet one thing will not change: the need for humans to strategically analyze opportunities, manage the algorithms, and communicate the results in ways that other people can understand and appreciate. Working with subject matter experts and data scientists, your IT staff is the vital link between potential and realized opportunities with machine learning. When correctly deployed by an experienced team, machine learning can produce transformative insights and bottom-line results.

Wondering where to start?

The following three practical applications of machine learning are in common use today. Think about where your company or organization has a problem that could be solved using one or more of these machine learning applications:

**Classification**

If you have a large dataset where a record needs to be correctly sorted based on multiple related — but not necessarily causal — factors, machine learning can be powerful. One example: oil and gas companies are using regression
models to predict the likelihood of success for various potential drilling sites using testing data about the surrounding area and geology. They use all the available data to classify and triage drill sites into various categories. In the retail space, companies are using similar models to categorize shoppers by cross-referencing credit card data with order totals, types of purchases, and order frequency. Retailers can classify shoppers based on their needs and preferences, and then market to them accordingly.

**Computer Vision**

When a computer needs to interpret images, machine learning plays a starring role. Luckily, many of these models are already well-developed and open source. They’re ready to be trained and deployed quickly for many computer vision applications. Machine learning is driving the advent of autonomous vehicles, as well as facial recognition technology in most smartphones.

**Speech & Text Language Processing**

The use of machine learning allows them to translate speech to text and even predict the sentiment and intention of your speech by learning the meaning of words and phrases. This ability enables intelligent chatbots to offer context-aware help and recommendations as part of customer support.

**One additional consideration**

Machine learning cannot solve every problem, and developing custom machine learning applications is both expensive and risky. But there’s good news too! For most companies, deploying a pre-trained model or running simple statistical analysis are low-hanging fruit you can harvest before taking a deeper machine learning dive. When correctly deployed by an experienced team, machine learning can produce transformative results.
About Intertech Executive Brief

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About The Author

Tom Salonek is the founder and CEO of Intertech, a technology consulting and training firm. Intertech has won more than 50 awards for growth and innovation, including being named one of the Top 30 Places to Work in Tech by Fortune magazine. He has an undergraduate degree in Quantitative Methods from the University of St. Thomas, where he was also an instructor at the Graduate School of Business Management Center, and has completed executive education at the Harvard School of Business and MIT.

To find out how Intertech can help you create and implement Successful Machine Learning, click here

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