Artificial Intelligence for Executives

Integrating AI Into Your Organization

§sas

THE POWER TO KNOW.

Contents

Want a Successful AI Strategy?
Start With Leadership and Vision

"Great leaders are almost always great simplifiers who can
cut through argument, debate and doubt to offer a solution
everybody can understand."

– Colin Powell

Information on artificial intelligence (AI) is flooding the market, media and social channels. Without doubt, it's certainly a topic worth the attention. But, it can be difficult to sift through market hype and grandiose promises to understand exactly how AI can be applied in practical and reliable solutions. Like most technological advances, incorporating new technology into business processes requires significant leadership and effective direction that all stakeholders can easily understand.

Great leaders become great by balancing strategy with tactics, future vision with current reality and strengths with weaknesses – all with the goal of accomplishing a clearly defined objective. Great leaders also understand that people are the most valuable resources within their organization. To drive and inspire their success, you must optimize strengths while recognizing inherent weaknesses.

Many of our daily human experiences and interactions involve machines or devices of some sort. Technology is an integral part of our lives. Because of that, it's time to evaluate how we can better use the strengths of machines (while acknowledging their weaknesses) to augment our ability to understand and improve the world around us.

Advances in machine learning have allowed us to create systems that can automate complex tasks through constant learning. We might be inclined to say that these computers are intelligent based on the tasks they accomplish and the way they interact with us while performing those tasks. Indeed, computers can learn, understand and make assessments about the world based on information we provide to them.

We have evolved beyond telling these machines what to do with our data. Now, machines can learn from patterns and anomalies they find in data on their own. These are patterns and anomalies that our human minds can't feasibly find, due to the sheer size and complex intricacies that exist within the data. A computer's strength comes from its ability to reliably, efficiently and accurately analyze large volumes of data without fatigue.

But, the computer doesn't understand strategy. It is limited to a specific task, which it executes in a very intelligent manner. Its ability to learn and provide insights is limited in scope. It still requires humans to take those insights and determine what role they will play in a larger strategy that accomplishes our identified objectives.

If we can harness the strengths of machines and artificial intelligence, while acknowledging the weaknesses, we can use current technologies to achieve future success.

It's time to evaluate how we can better use the strengths of machines to augment our ability to understand and improve the world around us.

Understanding the Basics of Artificial Intelligence

To understand artificial intelligence as it stands today, it's important to define the term and understand its foundation.

Artificial intelligence is the science of training systems to emulate human tasks through learning and automation. At its core is the ability for the machine to learn how to apply logic and reason to gain an understanding from very complex data. Simply put: The machine learns from data it receives by identifying patterns and relationships within the data itself.

The machine can ingest massive amounts of information, extract key features, determine a method of analysis, write the code to execute the analysis and produce intelligent output – all through an automated process. Once operational, this automated process occurs with minimal intervention (though substantial influence) from its human counterparts.

Foundational Building Blocks and Key Elements

Artificial intelligence has the following core technologies: machine learning and deep learning, computer vision, natural language processing, and forecasting and optimization. The foundational skills a machine needs to learn from data and produce a result are not new. SAS has been a pioneer in machine learning for more than 40 years and we have nearly 30 years of expertise in natural language processing. Our foundation is strong and stable; our analytical technologies are innovative.
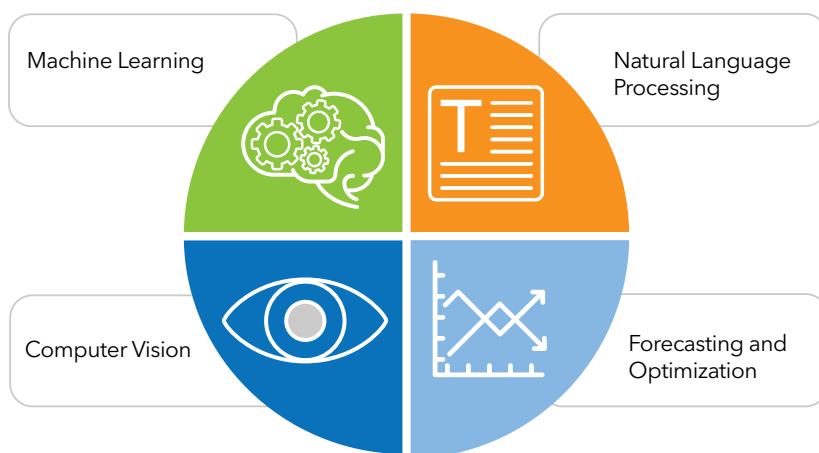

Figure 1: SAS supports and enables the core technologies of artificial intelligence.

In addition to the core technologies, real-world AI solutions will require tools to manage data and deploy at scale. SAS helps organizations with the entire analytics life cycle – from data management to visualization to decision support and deployment.

The combination of constantly growing data and significantly increased computing power has extended machine learning and deep learning capabilities. Increases in

computing power enable computers to ingest bigger data and run bigger models with better algorithms. Machines can continuously analyze substantial amounts of information and transform what they have read, heard and observed into intelligent insights at a tremendous operational scale.

To best use the deep insights that artificial intelligence produces, we must teach the machine to understand, interact and communicate with us in a very human way.

What a machine can learn, comprehend and reason is useless if we can't understand the output or provide new input in an intuitive manner – through language. Building on the foundational skills of NLP, advances in machine learning have extended language capabilities to facilitate stronger collaboration between humans and machines. Machines can now chat with us through both text and speech while constantly learning and gaining insights through each interactive experience. They can analyze language nuances such as slang, sarcasm and colloquial phrases to capture sentiment, meaning and intent – all of which enable natural language understanding (NLU).

Building AI Capabilities

These elements (machine learning and deep learning, computer vision, natural language processing, and forecasting and optimization) can be used independently or together to build an AI capability A capability is the operational task you want a machine to perform, and it requires you to consider the objective you want to achieve. AI capabilities can continually learn and adjust to changing conditions in data.

Here are some ideas for how you could use AI capabilities in a business context:

- **Pattern recognition.** Understand typical trends or behaviors for customer financial transactions and spot anomalies in an account's spending data to identify potentially fraudulent behavior.

- **Prediction.** Capture short- and long-term variability in data to improve forecasting of energy consumption.

- **Classification.** Examine animal track images and group them by species type to support wildlife conservation efforts.

- **Image recognition.** Determine if nodes on a raw CT scan are malignant or benign.

- **Speech to text.** Transcribe customer call center voice messages to text for detection of sentiment and further analysis.

- **Cognitive search.** Offer personalized recommendations to online shoppers by matching their interests with other customers who purchased similar items.

- **Natural language interaction (NLI).** Tell a software application to generate a report on sales revenue predictions without having to run the reports yourself.

- **Natural language generation (NLG).** Get summaries of everything that has been analyzed from a large document collection.

AI applications are then built from these AI capabilities, which can be used independently or combined, based on the problem you want to solve. All AI applications are dependent on objectives and data.

> AI capabilities can continually learn and adjust to changing conditions in data.

Identifying Opportunities for AI

AI requires a vision to achieve. Your vision isn't cookie cutter, so your AI application shouldn't be either. Understanding how to use the elements and capabilities to build an AI system requires a strategy supported by very deliberate, measured steps to accomplish your unique objective.

Banking	Government	Health and Life Sciences	Manufacturing and Energy	Communications
Fraud Detection	Smart Cities	Predictive Diagnostics	Supply Chain Optimization	Conversational Chatbots
Credit Analysis	Sensor Fusion	Biomedical Imaging	Automated Defect Detection	Contextual Marketing
Automated Financial Advisers	Facial Recognition	Health Monitor	Energy Forecasting	Network Analysis

Pattern Recognition • Classification • Image Recognition • Speech to Text
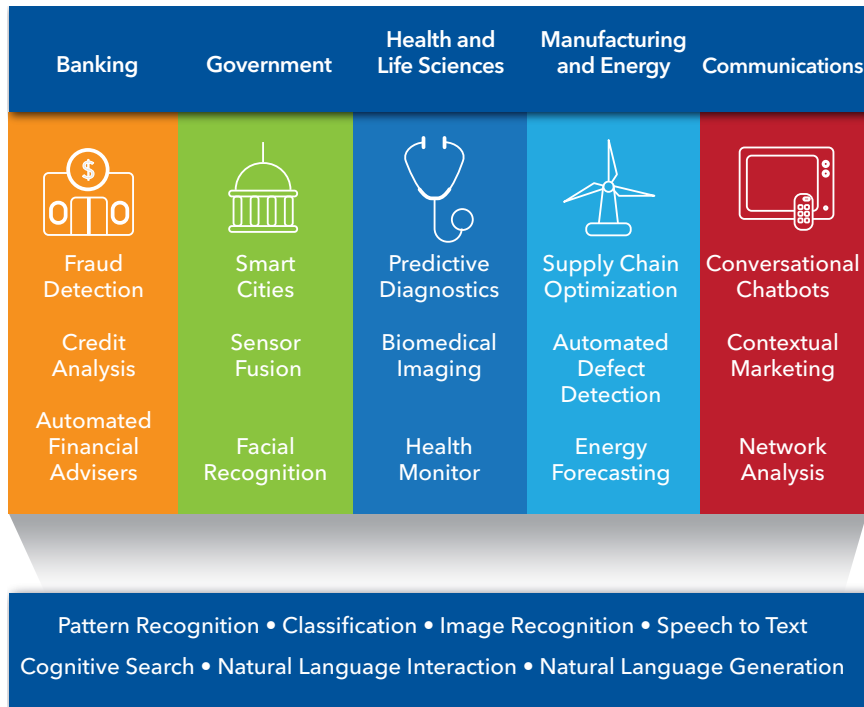Cognitive Search • Natural Language Interaction • Natural Language Generation

Figure 2: The SAS approach to AI.

Here are a few examples of how industries are applying AI:

- **Banking.** Fraud detection, credit and risk analysis, and market recommendations provided by automated financial advisers.
- **Government.** Sensor fusion in smart cities and facial recognition by law enforcement agencies.
- **Health and life sciences.** Processing data from past case notes, biomedical imaging and health monitors to advance the use of predictive diagnostics and improve response times in patient care.
- **Manufacturing and energy.** Supply chain optimization, automated detection of defects during production and energy forecasting.
- **Communications and retail.** Improved chat bot functionality, personalized shopping experiences and customized recommendations.

Executive Leadership for AI Implementations

A great deal of investment and planning must be done to successfully implement AI applications. Failure to strategize in a holistic manner will result in barriers to adoption by both internal and external stakeholders. When creating a business strategy, understand that analytics and AI are only one piece.

For AI to be used effectively, it's important that the strategy around it feeds into your larger business strategy, always taking into account the convergence of people, process and technology.

- **People.** First and foremost, humans are the most important resource an organization has. You must invest in data scientists who have skills focused around machine learning to build your applications; systems engineers who ensure the appropriate infrastructure is in place to support those applications; solution architects who oversee enterprise implementation; and business advisers who understand unique factors within the data and the business value that will be derived from the application.

- **Process.** Second, consider what organizational (and possibly cultural) changes will have to be made within your business. There must be cohesion between developers and IT to ensure that models are able to be put into production in a timely manner. There are expectations within both groups that must be clearly defined and agreed upon. A great deep learning model has no value if it cannot be put into production. And, you need lots of rich data. You must identify what data you want to analyze, what factors must be captured in your data collection and the method you will use to bring that data into your AI system. Make sure that users understand the expectations of working with output from the AI applications, and create a simple process for capturing input so the solution can be tailored for more accuracy and increased relevance to meet each business need.

- **Technology.** Graphics processing units (GPUs) can greatly accelerate training time for deep learning models, which will require a hardware investment. Streaming capabilities should be considered as well because they can help score data at its source. Although there is a great deal of sophistication behind AI technologies, technology is the easy part of a strategy. Barriers to adoption and implementation sit within people and processes, so make sure those areas receive a great deal of focus, consideration and leadership when designing any AI strategy.

> For AI to be used effectively, the strategy around it needs to feed into your larger business plan.

Integrating Artificial Intelligence Into Your Analytical Strategy

When it comes to driving strategy, using the right tactics at the right time is essential to achieving success. Despite the hype, artificial intelligence is not the correct solution to every problem. Understanding where, when and how to apply these capabilities within a larger strategy requires expertise in both industry and analytics.

At the same time, artificial intelligence should not be a black-box tool that operates separately from the rest of your organizational strategy. There will be problems that are best solved by more traditional methods and others that are ideal for the application of artificial intelligence. A differentiator for SAS is our ability to combine traditional and modern machine learning methods in the same platform, working on the same data with an integrated security model. It's simple – one platform, any analytical method.

We believe that analytics should be applied wherever there is data. This is why we are embedding artificial intelligence capabilities into our SAS® Platform. As we continue to make advances in the field of artificial intelligence, you will automatically benefit through future releases of SAS technology. Our platform is designed to support the entire analytics life cycle because we understand that a carefully designed and well-implemented analytics strategy helps organizations achieve more.

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You understand your strategy; we understand analytics. With our guidance, you can integrate advanced analytics, including artificial intelligence, into your strategy – and understand the strengths and weaknesses of various methods based on your goals. Together, we'll apply practical, real-world analytics that set a clear path for realizing your vision and accomplishing your objectives.

Learn More

To learn more about artificial intelligence and SAS solutions for AI, please visit sas.com/ai.

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