Cool Vendors in AI Core Technologies — Scaling AI in the Enterprise

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Initiatives: Artificial Intelligence

> AI technologies are pushing the boundaries of AI applications in the enterprise. Data and analytics leaders can consider these Cool Vendors to address priorities around managing, governing and scaling AI initiatives across different industries.

Additional Perspectives

- Summary Translation: Cool Vendors in AI Core Technologies — Scaling AI in the Enterprise
  (24 June 2022)

More on This Topic

This is part of an in-depth collection of research. See the collection:

- 2022 Cool Vendors Pave New Paths for Democratized Digital Delivery

Overview

Key Findings

- As per the 2021 AI in organizations survey, small and midsize enterprises face significant challenges in moving from pilot to production, with higher failure rates than larger enterprises
- The survey revealed that the data challenges of accessibility, volume and quality are the top three barriers to AI implementation.
- Two in five organizations that are already using AI have had an AI privacy breach or security incident. Of those, one in four were malicious attacks.

Recommendations

Data and analytics leaders tasked with AI implementation should:

- Accelerate the time to value from AI initiatives by exploring and leveraging new solutions offered by startup vendors based on your use cases and industry needs.
- Explore the breadth of solutions that address your priorities such as faster model development, ModelOps, data quality, AI explainability and security.
- Compose AI projects by choosing solutions that allow you to measure ROI, be agile, reduce risk and ensure higher model performance.

Strategic Planning Assumptions

By 2025, regulations will necessitate focus on AI ethics, transparency and privacy, which will stimulate — instead of stifle — trust, growth and better functioning of AI around the world.

By 2025, 50% of enterprises will have devised artificial intelligence (AI) orchestration platforms to operationalize AI — up from fewer than 10% in 2020.

In 2023, 20% of successful account takeover attacks will use deepfakes to socially engineer users to turn over sensitive data or move money into criminal accounts.

By 2024, 60% of AI providers will include a means to mitigate possible harm as part of their technologies.

Analysis

This research does not constitute an exhaustive list of vendors in any given technology area, but rather is designed to highlight interesting, new and innovative vendors, products and services. Gartner disclaims all warranties, express or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose.

What You Need to Know

The AI in Organizations Survey, 2021 has shown that AI has matured from “cool” in 2017 to “productive” in 2019, and is now becoming increasingly strategic in 2021. Enterprises are succeeding at deploying initiatives. Organizations’ AI needs have become more pragmatic as they push the envelope of AI investments to deliver greater value. This survey also revealed that, on an average, organizations take seven months to develop AI initiatives, which is down by two months from 2020, when organizations took around nine months (see Figure 1).

Figure 1: 2020 vs. 2021

n = 212 (2020); n = 325 (2021); All using/deployed AI (S08), excluding "unsure"

Q: On average, how long does it take for your AI initiative to develop from a prototype to make it to production?
Source: Gartner 2019, AI in Organisations (Left), Gartner P-21023 AI in Organizations Survey 2021 (Right)
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The Cool Vendors in this research help address the following mission-critical priorities of data and analytics leaders:

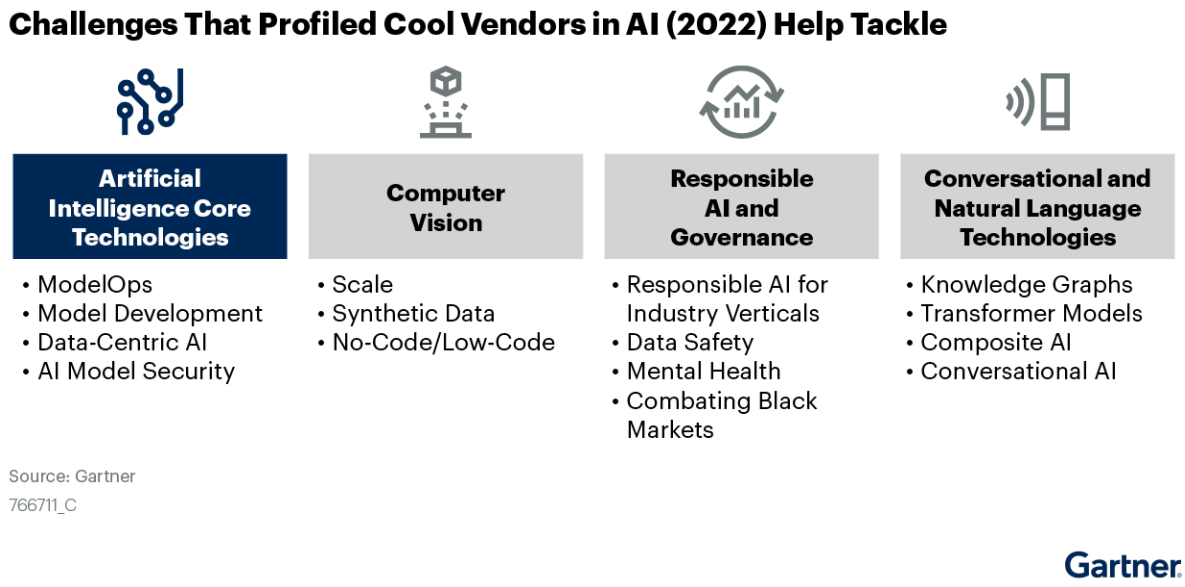
- **ModelOps:** The focus of ModelOps is steadily evolving from standardization to augmentation and visibility. Automating delivery, monitoring, governance and scaling up of AI models is becoming a priority for end-user clients. Verta has capabilities to address this priority.
- **Model development:** Finding the best model and searching through the right combination of hyperparameters can be a daunting task and requires significant effort and resources. Comet can help with this.
- **Data-centric AI:** Organizations must pivot to a data-centric AI approach to improve the quality of their AI models. Having a solid data foundation is key to unlocking the potential of AI, and in many cases, data quality remains a huge barrier to AI implementations. Snorkel can help you with this priority.

- **AI security:** Securing AI is essential to operationalizing AI successfully in the enterprise. Traditionally, companies find themselves behind on security measures, and unfortunately, they don't take security seriously until they experience their first breach or compromise. Most organizations are not even aware that benign actors can cause severe damage just by mistake. CalypsoAI can help here.

To get a more holistic view of the Cool Vendors in Artificial Intelligence, D&A Leaders can also consider reviewing the following (see Figure 2):

- Cool Vendors in AI for Computer Vision
- Cool Vendors in Conversational and Natural Language Technologies
- Cool Vendors in Responsible AI and Governance — From Principles to Practice

Figure 2: Priorities That Cool Vendors in Artificial Intelligence, 2022 Help Tackle



CalypsoAI

San Francisco, California, U.S. (http://www.calypsoai.com)

Analysis by: *Afraz Jaffri, Alexander Linden*

Why Cool: CalypsoAI provides easy-to-use, novel solutions to the complex problem of model validation and testing for computer vision models. Its aim is to provide a generally applicable testing framework that allows democratization of model testing. The core of the platform consists of a common language with building blocks and process pipeline to allow better analysis of various types of model risks. The solution lowers the barrier to entry for non-AI professionals to independently test models without the need to code.

Many organizations struggle to test their models comprehensively. This leads to hesitancy when deploying models to production. This is due to potential risk exposure from corner or edge cases that have been missed in internal testing and security risks where sensitive training data could be reengineered by adversarial model attacks. In computer vision, this could include reconstituting individual facial or medical images.

The CalypsoAI platform, VESPR Validate, can be deployed to hybrid cloud or on-premises environments and supports models built in PyTorch or TensorFlow frameworks. The platform works by taking the training dataset and model and executing a series of test routines. These include stress tests to assess how the model performs under various image/video degrading schemes. This also includes adversarial attack tests to assess how robust the model is to manipulation and privacy tests where reverse engineering of test data from only having access to the model is attempted.

Challenges: The challenges faced by CalypsoAI include:

- Market maturity for model validation and testing is embryonic, and the needs of organizations are diverse; this impacts the functionality the product needs to deliver for different use cases.
- The lack of model risk ownership in organizations and model validator roles means a scattered go-to-market approach, where CalypsoAI likely will have to focus on more mature organizations. Other organizations will need support with their processes and controls, not just technology.
- The lack of industry standards for model testing requires a well-established and thoroughly vetted assessment of the platform to ensure it meets regulatory standards and internal compliance thresholds.

Who Should Care:

- Data and analytics leaders who are responsible for AI systems that involve computer vision models can leverage CalypsoAI to stress test models under degrading image/video schemes.
- Enterprise risk management leaders responsible for governing models and conducting model risk assessments can transfer individual computer vision best practices to other AI tasks.
- Data and analytics service providers can leverage CalypsoAI's technology as a component in model audit and verification offerings.
- Security and risk management leaders responsible for securing AI models from adversarial attacks can leverage CalypsoAI for model robustness checks and adversarial defense.

Comet

New York, New York, U.S. (https://www.comet.ml/)

Analysis by: *Sumit Agarwal, Chirag Dekate*

Why Cool: Comet enables platform-agnostic experiment logging through a minimalistic interface requiring invocation of the experiment API through a helper function. Comet makes the tracking and analysis of various experiments very simple and intuitive. Specifically, Comet's approach enables data and analytics leaders to simplify exploration of various features, algorithms and hyperparameters as well as analysis of several metrics to find the best model for the specific problem. Comet's approach enables comparison of these parameters across hundreds of experiments and simplifies identification of the best-fit solution, which otherwise would be time and resource intensive.

The two-line code enables the logging of various metadata within the Comet instance. The autologging also integrates SHapely Additive exPlanations (SHAP) for explanations. The intuitive user interface provides the ability to compare various experiments, metrics with additional enhancements to identify data population segments with reduced performance and very pragmatic visualization capabilities to highlight the patterns comparing various experiments. The experimentation platform provides integration with PyTorch, TensorFlow and Keras. It also provides SDKs for Python, R, Java and JavaScript, thus providing various programming options to the data scientists.

Comet also provides model monitoring capabilities for models deployed in different platforms. Comet provides analysis leveraging density charts to provide a comparison between performance at the time of training with the production inferences. In addition, the Comet platform provides a higher level of research focus to the data scientists as they work to develop the best model.

Challenges: Comet faces the following challenges:

- Comet faces increasing competition from end-to-end data science machine learning platforms, products focused on experiment tracking and products focused on model monitoring. Comet is providing both experiment tracking and monitoring capabilities as a way to differentiate. The access to training metrics as a baseline for model monitoring does give it an advantage over the pure-play experiment tracking or model monitoring products. However, the continued enhancements of product capabilities by other vendors may reduce this differentiation.

- Many organizations also seek to minimize the number of products within their end-to-end ML development and deployment process. Although experiment tracking of deep learning models and even machine learning models is a complex task across a large number of executions, organizations may prefer large platforms for the sake of ease of integration instead of best-of-breed capabilities.

Who Should Care:

- Organizations seeking to develop deep learning models within regulatory environments would benefit from the added rigor to the model development along with the increased traceability and optimization capabilities. These capabilities are useful even in nonregulatory environments because they help with the development of high-performing models.
- Organizations with mature data science teams or expert data scientists would benefit from a product enabling experimentation at scale for complex deep learning models.

Snorkel

Redwood City, California, U.S. (https://snorkel.ai/)

Analysis by: *Alexander Linden, Farhan Choudhary, Chirag Dekate*

Why Cool: Snorkel AI offers an augmented, low-code, governed and faster way of overcoming manual data labeling tasks in AI at an economical cost. Snorkel AI offers a way to turn domain knowledge into so-called labeling functions. The labeling functions authored in the Snorkel Flow platform can capture signals from disparate data sources such as legacy systems, crowd labels, heuristics and third-party models. This can assist data augmentation practices. The platform allows authoring of labeling functions for subject matter experts (SMEs), data scientists and other personas with an intuitive no-code and a code-based interface. The platform also offers prebuilt labeling templates to reduce time to value.

These labeling functions allow users to hypothesize target labels. To illustrate, if a token, such as the word "stock," was present in the input space (image, sentence or any data record), a labeling function could determine that this text is most likely about "financials." Such labeling functions can often be incorrect or even in conflict with each other. Snorkel AI's paradigm of weak supervision is based on the research carried out by Stanford AI Lab that labeling functions will do more good than bad in the learning process, when modeled appropriately. This will therefore result in much faster ML training, while significantly reducing the need for tedious training label collection.

The Snorkel Flow platform offers error analysis and model-assisted feedback for training data iteration to achieve production-grade model performance. The platform integrates with major open-source ML platforms and can work on-premises, in a public cloud or through a Snorkel-hosted server. Snorkel provides instructional training for domain experts and SMEs on data labeling and management.

Challenges:

- Snorkel's offering would benefit from stronger storytelling and targeting the right persona. It currently targets internal data science teams, which limits its ability to scale across large enterprises.
- Because Snorkel's intellectual property may not easily be protected, larger vendors are likely to follow suit and potentially add complementary knowledge engineering capabilities.
- Technically, labeling functions can be very heuristic and easily lead to overgeneralizations.

Who Should Care:

- Snorkel can address one of the largest bottlenecks to AI today — quality and reliable labeled data at an economical cost.
- Snorkel's approach will be interesting to all D&A leaders and data science teams where heavy domain expertise needs to be embedded in data labeling tasks.
- The Snorkel Flow platform has been largely deployed in healthcare, finance and government.

Verta

Palo Alto, California, U.S. (https://www.verta.ai/)

Analysis by: *Soyeb Barot, Chirag Dekate, Farhan Choudhary*

Why Cool: The Verta Model Delivery & Operations Platform helps build high-quality models and release them to production faster, using a centralized Model Catalog, integrated experiment tracking system, model deployment, dataset versioning, and automated model metadata monitoring and visualization capabilities. What is unique is its centralized Model Catalog system that tracks end-to-end metadata record state transitions and release life cycle from development, staging and production to archive. It also monitors the models for metrics such as data drift, outliers and model quality degradation. The Verta platform integrates with existing CI/CD pipelines like Jenkins and GitOps using webhooks to trigger downstream actions for model validation and deployment. With a plethora of data science and machine learning (DSML) tools being used within the organization, building a CI/CD pipeline that can bring consistency to the delivery and management of various ML artifacts is challenging. In addition, there is complexity with the DSML tools being implemented across various environments (on-prem, cloud, multicloud, edge).

The Verta platform provides a single model management system that unifies models, associated metadata captured during experimentation and artifacts for better discoverability. This facilitates collaboration of production-ready models and the sharing of these models across multiple product teams within the organization. The Verta Model Delivery & Operations Platform takes any ML model (irrespective of framework and language) and packages and delivers it in a variety of formats, including real-time APIs, batch prediction and streaming, by using DevOps support for CI/CD, operations and monitoring. Thus, it automates delivery, increases availability, scales and simplifies the workflow for managing the AI environments.

Verta also provides a comprehensive model governance framework that allows MLOps teams to build custom approval workflows and integrate with preferred ticketing systems. It also supports efforts to configure and customize model promotion schemes, approval processes and release models once they pass basic security and fairness checks. Verta also creates detailed audit logs of this activity for compliance via granular access control for editors, reviewers and collaborators.

Challenges: Verta faces the below challenges:

- The MLOps/ModelOps space has seen an explosion of vendors supporting the capability for heterogeneous DSML vendor architectures. In addition, the traditional DSML SaaS and PaaS vendors have been extending the functionality to support multivendor integration and workflow management across multiple environments via containers and Kubernetes framework. Verta has stiff competition and an opportunity to stand-out if it keeps building on the integration of support for ML libraries, frameworks and compute environments alongside establishing the collaboration between data science and DevOps teams.
- Model governance, responsible AI, ethics and bias detection are becoming important considerations for enterprises as they look to bring in an operationalization/orchestration tool within their architectures to rein in the sprawl of multiple DSML tools being adopted by product teams. Verta will need to look at enhancing product capabilities in this area to differentiate itself within the marketplace.

Who Should Care:

- Organizations looking for ML or AI orchestration tools that have multiple DSML tools for building models would benefit from a single consistent model management hub, CI/CD pipeline and monitoring with the increased traceability and automation capabilities with Verta. This helps ensure model reproducibility and quality from experiment to production for organizations requiring auditability for compliance and regulation.

- Organizations with complex workloads (variety or volume) and stringent security, compliance and infrastructure requirements can benefit from Verta's enterprise-ready platform. The platform provides rich collaboration capabilities to increase team productivity with a security framework to manage users and teams through a robust RBAC system that integrates with identity systems (e.g., Okta and Active Directory). This allows the DevOps teams the ability to easily integrate Verta into their existing IT infrastructure and guarantee scale, reliability and governance.

Evidence

2021 Gartner AI in Organizations Survey: This study was conducted to understand the keys to successful AI implementations and the barriers to the operationalization of AI.

The research was conducted online from October through December 2021 among 698 respondents from organizations in the U.S., Germany and the U.K. Quotas were established for company size and for industries to ensure a good representation across the sample. Organizations were required to have developed AI or intended to deploy AI within the next three years.

Respondents were required to be part of the organization's corporate leadership or report into corporate leadership roles, and have a high level of involvement with at least one AI initiative. Respondents were also required to have one of the following roles when related to AI in their organizations: determine AI business objectives, measure the value derived from AI initiatives or manage AI initiative development and implementation.

The survey was developed collaboratively by a team of Gartner analysts and Gartner's Research Data, Analytics and Tools team.

Disclaimer: Results of this survey do not represent global findings or the market as a whole, but reflect the sentiments of the respondents and companies surveyed.

Document Revision History

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Cool Vendors in AI Core Technologies, 2017 - 16 May 2017

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