Quick Take

Hyperion Research Study Quantifies Use of HPC for Economically Important AI Applications

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July 2021

HYPERION RESEARCH OPINION

Several years ago, anecdotal evidence led Hyperion Research to compile a list of applications that promised to be the most economically important HPC-enabled AI use cases. Rather than simply drawing attention as interesting one-off examples, these applications had emerged as repetitive AI workloads that vendors could begin to pursue as emerging market segments. Hyperion Research's recently completed multi-client study of the worldwide HPC market presented a direct opportunity to ask HPC user organizations whether they use or plan to use any of the economically important HPC-enabled AI applications (Table 1).

TABLE 1

Use of Economically Important HPC-Enabled AI Applications

	Overall Percent	Industry Percent	Government Percent	Academia Percent
Business intelligence	27.0%	35.4%	4.3%	22.2%
Precision medicine	24.8%	17.1%	21.7%	44.4%
Internet of things and/or edge computing	20.6%	24.4%	13.0%	16.7%
Fraud or anomaly detection	19.1%	24.4%	8.7%	13.9%
Cyber security	18.4%	20.7%	21.7%	11.1%
Automated driving systems	15.6%	13.4%	8.7%	25.0%
Smart cities	14.2%	9.8%	17.4%	22.2%
Affinity marketing	6.4%	8.5%	0.0%	5.6%
Other	20.6%	22.0%	21.7%	16.7%
None of the above	19.9%	15.9%	30.4%	22.2%

n = 141; 82; 23; 36 (respectively)

Source: Hyperion Research, 2021

HIGHLIGHTS OF THE FINDINGS

The table's left-most data column shows the aggregate findings for all 141 of the HPC user organizations Hyperion Research surveyed for the study. Together, these organizations host over 2,000 HPC systems. The columns to the right of this split out the findings by major market segment: industry, government, and academia. Among the salient findings are these:

- Overall, only about 20% of the organizations said they don't use or plan to use any of the applications, implying that about 80% already use or intend to use one or more of the application types. Note that 30% of government sites said that they aren't doing work in these areas.
- The fraction of respondents saying yes to individual applications ranged from 14% to 27%, except for affinity marketing (6%). This confirms that most of these applications have already gained strong footholds in the global HPC market.
- Most of the applications have relevance across industry, government, and academia, though the degree of that relevance varies. For example, more than one-third (35%) of the industry respondents and over one-fifth (22%) of the academic sites use or plan to use AI-based business intelligence, but that number plummets to 4% among government sites.
- The exceptionally strong response to precision medicine in academia (44% of sites) likely reflects the near universality of medical research at these institutions, along with the known rise of precision medicine among teaching hospitals, which are often associated with universities large enough to acquire HPC systems. Due to the enormous sums of money many governments spend on health care annually, Hyperion Research believes that precision medicine, over time, will become the highest HPC revenue source among the listed applications.

FUTURE OUTLOOK

For the first time, Hyperion Research can start to quantify and compare the most economically important use cases for HPC-enabled AI through new data from this large recent study. As AI continues to grow in adoption in HPC data centers, these eight use cases that Hyperion Research closely tracks will become more widespread. Expect future HPC datacenter deployments to be architected to not only handle the traditional modeling and simulation workloads, but also address the needs of the newer applications in the analytics space. The incorporation of new hardware and software solutions as well as human expertise will be critical for enabling HPC researchers to explore the AI space, as well as incorporate HPC technologies and skills into data-intensive applications.

HPC has become nearly indispensable at the forefront of AI-supported R&D, not only for advanced scientific and engineering research but also for an emerging list of use cases that have strong potential for commercial exploitation. Most of these data-intensive applications will benefit from a combination of established modeling and simulation (M&S) methods and newer analytics (HPDA-AI) methods, and from the close coupling of IoT-edge computing (local requirements) with HPC resources in clouds or data centers (deeper or wider-area analysis). HPC's important role in enabling and advancing these economically important applications promises to make high performance computing a larger and more attractive market, as Hyperion Research's five-year forecasts indicate. In addition, these opportunities and attendant challenges will motivate users and vendors alike to accelerate innovation on many fronts, from algorithms and methodologies to architectures, in order to advance the state-of-the-art in artificial intelligence.

** For more information about the study this data was extracted from, please contact info@hyperionres.com to get details about the latest Multi Client Study (MCS).*

About Hyperion Research, LLC

Hyperion Research provides data-driven research, analysis and recommendations for technologies, applications, and markets in high performance computing and emerging technology areas to help organizations worldwide make effective decisions and seize growth opportunities. Research includes market sizing and forecasting, share tracking, segmentation, technology and related trend analysis, and both user & vendor analysis for multi-user technical server technology used for HPC and HPDA (high performance data analysis). Hyperion Research provides thought leadership and practical guidance for users, vendors, and other members of the HPC community by focusing on key market and technology trends across government, industry, commerce, and academia.

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