Fujitsu on Artificial Intelligence

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Overview

- Through Uvance, Fujitsu enhances customer productivity and creativity by embedding Artificial Intelligence (AI) into its solutions as a specialized AI assistant.
- Fujitsu combines its own AI with solutions from other vendors to deliver the most powerful outcomes. Specifically, its generative AI amalgamation technology mixes multiple models without retraining to generate the core AI components customers need.
- Fujitsu's proprietary knowledge graph technology enables AI solutions that are able to leverage a company's business expertise and processes.
- Energy saving is a vital aspect for Fujitsu when developing AI solutions. Combining High-Performance Computing (HPC) with the powerful Central Processing Unit (CPU) of Fujitsu's Fugaku supercomputer provides the computing infrastructure necessary for advanced AI capabilities. At the same time, it also delivers the energy efficiency required for sustainable AI deployment.

Industry Trends in Brief

- AI plays a vital role in addressing global environmental challenges, fostering the development of a digital society, and enhancing people's well-being.
- To stay competitive and create new value, humans must utilize AI as a trusted assistant to enhance productivity and augment creativity.
- AI assistants are experts in understanding content and information about specific tasks. AI agents can make proposals to humans using multimodal information, such as images, videos, graphs, audio and expert knowledge. AI can also interpret linguistic information and provide effective support for human decisions and negotiations.
- To build and expand, executive leaders at organizations must utilize generative AI tools that enhance the overall skill set of their workforce, and leverage these as a force multiplier in solving both new and perennial problems. AI-enhanced businesses are also better prepared to meet unconventional threats by creating new roles to mitigate risk.
- AI assistants are widely applicable, but the "one-size-fits-all" solutions do not perform well in all applications.
- To realize AI's full benefits, Fujitsu is committed to implementing reliable and trusted AI to augment systems of record, and to enable users to acquire AI literacy. Fujitsu also believes that humans are responsible for providing governance and addressing issues related to AI accuracy, fairness, copyright infringement, information management and misuse.

Fujitsu AI

Fujitsu advises organizations to follow three key stages in adopting AI:

1. Application: Enhance existing use cases by applying AI to improve current processes and outcomes.

2. Expansion: Automate more broadly by expanding AI to cover a broader range of operations and data analysis.
3. Development: Build industry-specific models by developing AI trained on specialized data to drive differentiated results.

As they progress through these stages, organizations will enable more employees to benefit from AI, unlocking industry-leading levels of value creation and transformation.

Global Expertise and End-to-End Support
Fujitsu's global team of expert engineers enable customers to accelerate AI adoption with deep knowledge of customer operations, data and AI technology. Fujitsu provides end-to-end support, from consulting and Proof-of-Concepts (PoCs) to implementation and professional services.

Enterprise-Grade Generative AI
Fujitsu helps organizations manage large volumes of diverse enterprise data with flexible customization and governance, ensuring generative AI complies with corporate policies and regulations. Fujitsu enterprise-grade generative AI accelerates communication and computation and can be tailored and fine-tuned for specific business needs. Fujitsu amalgamation technology allows generative AI to adapt to changing corporate requirements, and Fujitsu audit technology mitigates risks by controlling AI behavior.

Generative AI Reconstruction with Takane
A significant step forward is Fujitsu's newly developed Generative AI Reconstruction Technology, part of the Kozuchi AI service.

This technology automatically reconstructs AI models based on Fujitsu's large language model (LLM) Takane. The result is lighter, faster and more reliable models suitable for enterprise use.

Generative AI Reconstruction Technology addresses pressing challenges, including high development costs, environmental impact, and catering for deployment on the network edge, where both bandwidth and processing power are often limited.

The Generative AI Reconstruction Technology has two breakthrough components. Together, these technologies enable enterprises to rapidly build lightweight, specialized AI models that are reliable, cost-effective and environmentally sustainable.

- High-Precision Quantization (QEP: Quantization Error Propagation): A new algorithm that reduces model size and power consumption by compressing weights (from 16-bit to as little as 1-bit) while preserving accuracy, achieving world's highest accuracy retention rate of 89%. This enables models that typically require high-end GPUs to run efficiently on significantly smaller hardware set-ups, reducing memory use by up to 94%.
- Specialized AI Distillation technology. This is a world-first approach that systematically removes unnecessary knowledge from a foundation model while also optimizing its structure. This creates lightweight student models that can outperform even the teacher model on specialized tasks, with up to a 43% improvement in accuracy and an 11 times faster inference speed and operational costs by up to 70%, while reducing the number of parameters to 1/100th of the original.

Three Pillars of Fujitsu's AI Support

1. Specialized generative AI and trust: Suppressing hallucination and leveraging proprietary knowledge graph technology to ensure accuracy and reliability.
2. Fusion of advanced AI with computing leadership: Human sensing and causal discovery is powered by Fujitsu's world-leading supercomputing and quantum computing technologies.
3. A proven track record: Fujitsu has already transformed more than 7,000 AI use cases across industries. These range from optimizing sales while reducing greenhouse gases to predictive analysis, AI security, materials discovery, and beyond.

Innovation Across Industries

By combining proprietary technologies such as Generative AI Reconstruction, Knowledge Graph-based trust and amalgamation, Fujitsu delivers unique solutions. With these innovations, Fujitsu empowers enterprises to deploy AI that is lighter, greener, and more accurate, paving the way for industry transformation at scale.

Examples include:

- Creative industries: Generative AI that produces and colors designs aligned with creator intent.
- Healthcare and life sciences: Drug discovery AI that models molecular structures in latent space, combined with HPC-powered simulations to analyze real-world molecular behavior.

Relevant Fujitsu Products/Milestones

- Fujitsu Kozuchi is a brand of AI technologies developed by Fujitsu. These technologies are embedded in Uvance vertical offerings, hosted on the Data Intelligence Platform-as-a-Service (DI PaaS), or provided as a standalone product backed by professional services.
- Fujitsu Kozuchi is a comprehensive set of secure, reliable, cloud-based AI services that enhance the productivity and creativity of business operations. It consists of seven AI areas: Fujitsu Kozuchi Generative AI, Fujitsu Kozuchi AutoML, Fujitsu Kozuchi Predictive Analytics, Fujitsu Kozuchi for Vision, Fujitsu Kozuchi for Text, Fujitsu Kozuchi AI Trust, and Fujitsu Kozuchi XAI.
    - **Fujitsu Kozuchi Generative AI** offers an interface that bridges the gap between computer systems and humans, facilitating natural language and unstructured data processing, thereby enhancing human productivity and creativity. It provides anti-hallucination measures in a secure environment that prevents information leakage.
    - **Fujitsu Kozuchi AutoML** enables the automatic design, construction, and adjustment of AI models, even for non-data scientists. High-accuracy machine learning models can be generated in a short time. Additionally, when you input business issues in natural language, it automatically converts them into appropriate mathematical expressions and provides a function to automatically generate AI tailored to customer business.
    - **Fujitsu Kozuchi Predictive Analytics** enables more accurate predictions of future events using various data sources. Using dynamic ensemble models, it performs stable and high-accuracy demand forecasting tailored to the changing characteristics of multiple products, with automatic tuning that eliminates the need for human intervention.

- **Fujitsu Kozuchi for Text** processes and analyzes text digitized through natural language processing technology.
- **Fujitsu Kozuchi for Vision** can convert information input from optical devices, such as human and object postures, shapes, movements, and character recognition, into digital form and make analyses and judgments. It can easily recognize complex human behaviors using approximately 100 pre-trained basic action models and behavior recognition rules, all created with a no-code UI.
- **Fujitsu Kozuchi AI Trust** can verify the fairness of AI's learning data and judgments with simple operations from a web browser. Fujitsu supports the implementation of AI in systems for AI Ethics, AI Quality, and AI Security, as well as improving user-side AI literacy in terms of accuracy, fairness, copyright infringement, information management, and misuse.
- **Fujitsu Kozuchi XAI** can explain the causal relationships in the results output by AI. By exhaustively verifying all possibilities for table data, presenting explanations for judgment results and on-site improvement actions, and comprehensively calculating causal relationships under all conditions from vast amounts of data, Fujitsu ensures that no beneficial causal relationships are overlooked.

- Fujitsu Labs' AI technologies are also under development and are part of Fujitsu Kozuchi. These are available for proof of concept.
- DI PaaS itself provides superior analysis and data processing capabilities in terms of reliability, explainability, and output speed.
- Fujitsu AI-powered Uvance offerings include the ESG Management Platform, Digital SCM by AI, smarter stores through AI video analysis, creating a new shopping experience with generative AI, and transforming the clinical trial documentation process using AI.

Fujitsu quotes – Toshihiro Sonoda, Head of the Artificial Intelligence Laboratory, Fujitsu

- "Knowledge Graph Enhanced RAG of generative AI frameworks for enterprise, provided by Fujitsu, have the world's highest accuracy in handling extremely large amounts of data. We believe that is an important issue when companies use generative AI, and it is a major point of differentiation for Fujitsu."
- "Fujitsu's generative AI amalgamation technology is unique. It can respond to a variety of use cases by selecting the optimal generative AI for various customer queries and amalgamating them as necessary to generate new AI models. What makes this unique is that generative AI can be customized and provided to customers without detailed fine-tuning."

Reference customers

- Digitalizing safety at the Nürburgring
- REHAU Industries SE & Co. KG
- Toridoll Holdings Co., Ltd

