Google Cloud Launches AI-powered Solutions to Safely Accelerate Drug Discovery and Precision Medicine

Cerevel and Pfizer are using the Target and Lead Identification Suite—and Colossal Biosciences is adopting the Multiomics Suite—to bring therapeutics to market faster

BOSTON, May 16, 2023 /PRNewswire/ -- Today at theBio-IT World Conference, Google Cloud announced two new AI-powered life sciences solutions to accelerate drug discovery and precision medicine for biotech companies, pharmaceutical firms, and public sector organizations. Available worldwide today, the Target and Lead Identification Suite helps researchers better identify the function of amino acids and predict the structure of proteins; and the Multiomics Suite accelerates the discovery and interpretation of genomic data, helping companies design precision treatments.

Cerevel, Colossal Biosciences, and Pfizer, will accelerate drug discovery with new AI powered solutions from Google Cloud

"We've long been involved with creating new tools for understanding and working with the code of life, like high performance computing for genomic analytics, and artificial intelligence that can predict three-dimensional models of proteins," said Shweta Maniar, global director, Life Sciences Strategy and Solutions, Google Cloud. "These new solutions launching today can transform life sciences organizations by accelerating drug discovery and bringing therapeutics to market faster. When patients are waiting for that life-saving treatment in cancer care or that quality-of-life medicine for migraine headaches, this faster time-to-market can have an incredibly positive impact on lives."

Accelerating drug discovery with the Target and Lead Identification Suite
Speeding up target and lead identification is critical for the race to drug discovery. Currently, developing a new drug from an original idea to the launch of a finished product is a complex process that can take 12–15 years and cost more than $1 billion, according to the British Journal of Pharmacology. In addition, identifying a biological target involved in the disease that is viable for drug intervention can take up to 12 months (NIH, National Center for Biotechnology Information). at the same time, most companies use X-ray crystallography and nuclear magnetic resonance (NMR) to determine protein 3D structures, but this has a high ratio of failures. Finally, once the drug discovery process is underway, it's not easy to scale supporting technology up or down based on demand.

Google Cloud's Target and Lead Identification Suite enables biopharma companies to bring therapeutics to market faster by enabling more efficient in silico drug design. Its target identification will help companies quickly predict antibody structures, assess the structure and function of amino acid mutagenesis, and accelerate de novo protein design. This solution also enables lead optimization that can be used to discover novel, high-quality candidates at low cost for Quantitative Structure Activity Relationship (QSAR) studies or for Free Energy Perturbation (FEP) calculations.

The Target and Lead Identification Suite includes:

- **Data ingestion:** Allows companies to streamline the ingestion, sharing, and management of data, including discovering more data for research through public datasets and securely exchanging data assets with other organizations using Google Cloud's Analytics Hub.
- **Target identification:** Using AlphaFold2 and Vertex AI pipelines, organizations can more accurately predict protein structure, minimizing the high ratio of failures from traditional methods.
- **Lead identification:** With cost-effective high-performance computing resources, the solution accelerates target discovery, preparation of lead candidates, and virtual high-throughput screening, to find the most promising lead candidate molecules to start a successful drug discovery pipeline.

Early adopters for the Target and Lead Identification Suite include multinational pharmaceutical companies like Pfizer, and industry leading biotech companies like Cerevel.

"We are partnering with Google on exploring how AlphaFold2 can potentially accelerate our drug discovery process, speeding up our researchers' ability to conduct their experiments on Google Cloud's scalable, accelerator-optimized compute platform," said Nicholas Labello, sr. principal computational scientist at Pfizer, Inc.

"At Cerevel we aim to unravel the mysteries of the brain to solve some of the most difficult to treat neuroscience diseases, including evaluating novel therapies for schizophrenia, epilepsy, and Parkinson's disease. The Target and Lead Identification Suite with AlphaFold gives us a valuable tool to more efficiently evaluate and improve our discovery efforts," said Claude Barberis, vice president, Medicinal Chemistry at Cerevel. "The deeper understanding and insights we will be able to derive could ultimately get treatments for the most devastating neuroscience diseases onto the market faster, improving the day-to-day lives of millions of people."

Multiomics Suite
Genomic differences can affect susceptibility to certain diseases and the way that people respond to medicines, and increasing the diversity and pool of genomic understanding can help realize the potential of precision medicine. But harnessing the exponential growth in genomic data requires significant resources that many organizations are not able to support. In addition, there are high costs associated with acquiring, storing, distributing, and analyzing genomic data as the volume of data continues to increase, doubling every 7-12 months (BMC Bioinformatics).

Google Cloud's Multiomics Suite advances precision medicine care by transforming multiomics data into insights to advance scientific discoveries. Organizations can use this solution to streamline and accelerate analysis of genomic data, design clinical genomics, accelerate personalized medicine, and interpret genomic data to unlock new discoveries. The solution also provides structure and processes for researchers and data scientists to collaborate, saving time on developing net new paths, algorithms, or methods.

What sets the Multiomics Suite apart is that it is cloud agnostic, allowing organizations to leverage existing investments in multiomics in a simplified environment. It also offers complete traceability through Vertex AI, so customers can organize millions of artifacts in their cloud environments. Finally, it leverages the power of Google Research to transform hundreds of thousands of files, samples, and records to load variant call format (VCF) files from Google Cloud Storage into BigQuery for analysis.

"Google Cloud life science customers can benefit from our long experience in this domain. Vertex AI Pipelines and Datasets features are what provide this important, complete traceability for advanced experiments," said Maniar.

The Mutiomics Suite includes:

- **Data ingestion and analytics:** Allows organizations to streamline the ingestion, sharing and management of data, discover more data for research through public datasets using dataset dashboards from Collibra, and it enables customers to securely exchange data assets with other organizations using Analytics Hub.
- **Secondary analysis:** Enables organizations to ingest raw sequence files with genome-wide association study (GWAS) pipelines into Google Cloud Storage, extract variants using Batch API and NVIDIA's Parabricks for accelerated genomic analysis with tools like GATK and Google's DeepVariant, and accelerate processing using Compute Engine to turn raw sequencing (DNA/RNA) data into actionable insights in a scalable, secure, and cost-effective way.
- **Tertiary analysis:** Allows customers to identify genes associated with a particular disease or trait to be integrated into multimodal datasets, process and analyze variants using Variant Transform and BigQuery, scale AI and machine learning with Vertex AI, and visualize insights with Looker.

"Combining the science of genetics with the business of discovery, we endeavor to advance the economies of biology and healing through genetics," said Dr. Alexander Titus, vice president of Strategy & Computational Sciences at Colossal Biosciences. "With Google Cloud's Multiomics Suite, Colossal was able to see 52% reduction in overall cost and an 88% reduction in time to execute whole genome sequence analysis when compared with open-source tools—demonstrating dramatic improvements in overall computational efficiency. This accelerates our ability to solve critical problems for all life on Earth."

Google Cloud's ecosystem of delivery partners provides expert implementation of services for Target and Lead Identification Suite and Multiomics Suite to help life sciences organizations deploy at scale. These partners include EPAM Systems, Inc., Form Bio, Max Kelsen, Omnigen, Quantiphi, and others.

Privacy and security
Privacy and security are of the utmost importance in all aspects of Google Cloud's products and solutions. Through the implementation of Google Cloud's reliable infrastructure and secure data storage that support HIPAA compliance—along with each customer's layers of security, privacy controls and processes—customers are able to protect the access and use of patient data.

For more information on the Target & Lead Identification Suite and the Mutiomics Suite, visit https://cloud.google.com/life-sciences-solutions, or join the Google Cloud session at BioIT World on May 18, 2023 (for more information: https://www.bio-itworldexpo.com/drug-discovery-informatics#ShwetaManiar.)

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