Artificial Intelligence (AI) In Drug Discovery- Market Insight, Competitive Landscape And Market Forecast - 2027

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Report description:

AI In Drug Discovery Market By Type (De Novo Drugs Design And Optimization, Preclinical Testing, And Others), By Application (Oncology, Cardiovascular, Infection Disease, And Others), By End User (Pharmaceutcial & Biotechnology Companies, Contract Research Organizations, And Others), and by geography is estimated to grow at a healthy CAGR forecast till 2027 owing to rising prevalence of diseases and growing interest in leveraging artificial intelligence in drug development
Global AI in drug discovery market was growing at a CAGR of 37.67% during the forecast period from 2022 to 2027. The AI in drug discovery market is witnessing a positive market growth owing to the factors such as rising prevalence of various diseases across the globe which have necessitated the need for faster development of highly safe and efficacious drugs. Moreover, the realization of the advantages of AI in pharmaceutical sector is further motivating pharma companies and institutes to further invest in drug research and development. Additionally, the extensive partnerships and collaborations between public and private entities and both national and international levels are further expected to boost the AI in drug discovery market.
AI in Drug Discovery Market Dynamics:
One of the key aspects influencing the growth of the AI in drug discovery market can be high capital investment in the drug discovery and development process. Following the conventional method of drug discovery and drug development results in the consumption of 12-14 years till a final product, the authorized drug reaches the market for end use. For instance, as per the Pharmaceutical Research and Manufacturers of America, on average, a drug takes about 10 years to reach the market with clinical trials themselves accounting for 6-7 years out of the total time period. The same source further stated that the average cost to develop each successful drug comes out to be approximately USD 2.5 billion. The drug discovery step in the drug development process is extremely daunting as there is a vast chemical space, comprising >1060 molecules that may serve as the starting point for developing potential drugs. The advantages offered by AI in terms of machine learning, neural networks can recognize hit and lead compounds, and provide a quicker validation of the drug target and optimization of the drug structure design. Therefore, all the aforementioned factors point towards the advantages of including AI in drug discovery process helping in faster identification of targets, lead compounds and subsequent development of drug, thereby presenting a positive growth outlook for the AI in drug discovery market during the forecast period (2022-2027).

Another aspect of including AI in drug discovery and drug development process is leveraging the technology in understanding the patterns in the already published data to identify "trending" areas of research for different diseases that may provide insights regarding any scientific progress that may be utilized in initiating a new drug development program. This is done by using natural language processing (NLP) that helps in data mining and creating interconnected "knowledge graphs". These knowledge graphs are essentially a threading together of the data from different areas of drug development such as disease-related data, drug-related data, or chemical/biological-entity-related data. Moreover, certain companies are involved in finding new uses of already approved drugs. For instance, an AI-focused startup Healx makes use of such knowledge graphs to gain insights into rare diseases. The company is working on the data for 4,000 FDA-registered drugs and this approach has also yielded drug candidates for the company that showed efficacy in animal models. Thus, the application of artificial intelligence in sifting through humongous data to create knowledge graphs and identify potential lead compounds and disease areas is another aspect driving the growth of the AI in drug discovery market in coming years.
Furthermore, the adoption of AI solutions in the clinical trial process eliminates possible obstacles, helps in the reduction of clinical trial cycle time, and significantly improves the productivity and accuracy of the clinical trial process. Therefore, the adoption of these advanced AI solutions in drug discovery processes is gaining popularity amongst life science industry stakeholders. However, knowledge gaps between biologists, chemists, and AI scientists as well as limitations of traditional machine learning tools in handling the volume of data generated in the pharmaceutical field may prove to be challenging factors for AI in drug discovery market growth.
The AI in drug discovery market was one of the few markets that witnessed positive growth during the COVID-19 pandemic. Artificial intelligence platform was extensively leveraged in drug research for SARS CoV-2 virus. AI was also leveraged in drug repurposing, also known as drug repositioning helping in getting specific therapies to the market. For instance, Remdesivir was originally discovered as the potential treatment for Ebola virus disease; using drug repurposing via AI showed the drug to provide promising results in the treatment of the COVID-19 infection. Therefore, the market for AI in drug discovery exhibited positive trend during the pandemic thereby presenting a future outlook for AI in drug discovery during the forecast period from 2022-2027.

AI in Drug Discovery Market Segment Analysis:
AI in Drug Discovery Market by Type (De Novo Drug Design and Optimization, Preclinical Testing, and Others), by Application (Oncology, Cardiovascular, Infection Diseases, and Others), by End User (Pharmaceutical & Biotechnology Companies, Contract Research Organizations, and Others), and by Geography (North America, Europe, Asia-Pacific, and Rest of the World)
In the type segment of the AI in drug discovery market, the de novo drug design category is estimated to account for a prominent revenue share in market during the forecast period (2022-2027). This can be attributed to the advantages associated with AI in de novo drug design and optimization. Compared to conventional de novo drug design methodologies that include structure or ligand-based approaches among others are quite time consuming, artificial intelligence in de novo drug design applies different approaches in creating new targets from no previous information from large number of datasets. For instance, deep reinforcement learning (DRL) is a combination of artificial neural networks with reinforcement learning architectures, and has recently been employed in de novo drug design. Examples of DRL in de novo drug design is recurrent neural network (RNN) which has been successfully employed in the de novo drug design of novel molecular entities. An RNN is suitable for the analysis of sequential data such as text or molecules represented as a sequence of characters like SMILES. RNN works sequentially by processing one step at a time in a series of actions. RNN recognize and learn from SMILES strings' patterns and the molecules produced from the de novo molecule procedure are chemistry-driven. Therefore, considering the advantages associated with AI in de novo drug design, it is expected to be one of the key application areas of AI in drug discovery in coming years, thereby contributing in the market growth.

North America is expected to dominate the overall AI in Drug Discovery Market:
Among all the regions, North America is estimated to amass the largest revenue share in the global AI in drug discovery market in the year 2021. This can be ascribed to the presence of large patient population associated with various diseases including cancers, neurological disorders which in turn drive the demand for various drugs with minimal side effects. Moreover, the extensive focus on clinical research and the presence of key players in the region from both the pharmaceutical as well as the

technology domains further help in the growth of the North America AI in drug discovery market.
One of the key supporting factors for the growth of the North America AI in drug discovery market is the increasing prevalence of various diseases across the region. For instance, one of the prominent reasons for the requirement for high number of drugs in the surge in the prevalence of cancers in the United States. As per the figures mentioned by the American Cancer Society, in 2021, it was estimated that 1.9 million new cancer cases would have been diagnosed in the United States. The data provided by the Centers for Disease Control and Prevention (2021), in 2018, 1,708,921 new cases of cancers were reported. For instance, the American Cancer Society estimates that in 2022, approximately 287,850 new cases of invasive breast cancer are expected to be diagnosed in women in the United States. Therefore, the increasing incidence of cancers such as breast cancer along with other cancer types in the country is expected to further drive the demand for AI in drug discovery. In order to leverage the same, the National Cancer Institute (NCI), based in the United States, The Cancer Moonshoot in partnership with the Department of Energy (DOE) is supporting two major partnerships to leverage their supercomputing abilities to support cancer research by identifying and interpret features of target molecules that support cancer development and the second initiative being the RAS initiative to study the interaction of KRAS protein with the cell membrane using computational methods. Therefore, the rising prevalence of cancers in the country is boosting the development of cancer drug development, thereby providing conducive environment for the AI in drug discovery market to grow in the United States.
Similar to the United States, Canada also has a robust ecosystem for AI in drug discovery process which can be supported by the fact that numerous startups are working in the country amalgamating both AI and drug development. For instance, In January 2022, a Canadian AI startup BenchSci Analytics Inc. received USD 50 million that has Moderna Inc., Bristol Myers Squibb Co., AstraZeneca Plc and Sanofi as its clients. In December 2021, the startup of the Montreal-based renowned Mila Artificial Intelligence (AI) Research Institute, Valence Discovery announced the funding of the USD 8.5 million to support drug discovery efforts.
Thus, all the factors such as high disease prevalence, increasing focus on clinical research as well as drug development are expected to contribute in the growing demand for AI in drug discovery process. Furthermore, the acquisition of new technologies and the extensive presence of technology as well as pharmaceutical leaders in the region further helps in the regional growth of the market.

AI In Drug Discovery Market Key Players:
Some of the key market players operating in the AI in drug discovery market includes IBM Corporation, NuMedii Inc, Deep Genomics, NVIDIA Corporation., Atomwise Inc., Cloud Pharmaceuticals, Inc, Alphabet Inc (Deep Mind), Insilico Medicine, BenevolentAI, Exscientia, Cyclica., Valo Health Owkin, Verge Genomics, BioSymetics., and BeiGene others.

Recent Developmental Activities in AI in Drug Discovery Market:
? In January 2022, Sanofi entered into a research collaboration with Exscientia, which uses artificial intelligence to discover new drug candidates that could be worth up to USD 5.2 billion for the latter company.
? In December 2021, Insilico Medicine announced the start of the world's first Phase I clinical trial of a drug developed from scratch using AI. Its end-to-end platform applies AI to biology for target discovery, and to chemistry for drug design. The AI-designed drug is a small-molecule inhibitor and is developed for the treatment of idiopathic pulmonary fibrosis.
? In November 2021, Alphabet Inc. announced the launch of a new company- Isomorphic Laboratories which will leverage AI for drug discovery.

Key Takeaways from the AI in Drug Discovery Market Report Study
? Market size analysis for current AI in drug discovery market size (2021), and market forecast for 5 years (2022-2027)
? The effect of the COVID-19 pandemic on this market is significant. To capture and analyze suitable indicators, our experts are closely watching the AI in drug discovery market.
? Top key product/services/technology developments, merger, acquisition, partnership, joint venture happened for last 3 years
? Key companies dominating the global AI in drug discovery market.
? Various opportunities available for the other competitors in the AI in drug discovery market space.

? What are the top performing segments in 2021? How these segments will perform in 2027.
? Which is the top-performing regions and countries in the current AI in drug discovery market scenario?
? Which are the regions and countries where companies should have concentrated on opportunities for AI in drug discovery market growth in the coming future?

Target Audience who can be benefited from this AI in Drug Discovery Market Report Study
? AI in drug discovery products providers
? Research organizations and consulting companies
? AI in drug discovery -related organizations, associations, forums, and other alliances
? Government and corporate offices
? Start-up companies, venture capitalists, and private equity firms
? Distributors and Traders dealing in AI in drug discovery
? Various End-users who want to know more about the AI in drug discovery market and latest technological developments in the AI in drug discovery market.

Frequently Asked Questions for AI in Drug Discovery Market:
1. What is AI in Drug Discovery?
Artificial intelligence (AI) in drug discovery is the utilisation of advanced computing techniques such machine learning, artificial neural networks, and natural language processing to process large amounts of data to help with target, lead identification and other required inputs for drug discovery and development.
2. What is the global market for AI in Drug Discovery?
Global AI in drug discovery market was growing at a CAGR of 37.67% during the forecast period from 2022 to 2027.
3. What are the drivers for Global AI in Drug Discovery Market?
The AI in drug discovery market is witnessing a positive market growth owing to the factors such as rising prevalence of various diseases across the globe which have necessitated the need for faster development of highly safe and efficacious drugs. Moreover, the realization of the advantages of AI in pharmaceutical sector is further motivating pharma companies and institutes to further invest in drug research and development. Additionally, the extensive partnerships and collaborations between public and private entities and both national and international levels are further expected to boost the AI in drug discovery market.
4. Who are the key players operating in Global AI in Drug Discovery Market?
Some of the key market players operating in the AI in drug discovery market includes IBM Corporation, NuMedii Inc, Deep Genomics, NVIDIA Corporation., Atomwise Inc., Cloud Pharmaceuticals, Inc, Alphabet Inc (Deep Mind), Insilico Medicine, BenevolentAI, Exscientia, Cyclica., Valo Health Owkin, Verge Genomics, BioSymetics., and BeiGene others.
5. Which region has the highest share in Global AI in Drug Discovery Market?
This can be ascribed to the presence of large patient population associated with various diseases including cancers, neurological disorders which in turn drive the demand for various drugs with minimal side effects. Moreover, the extensive focus on clinical research and the presence of key players in the region from both the pharmaceutical as well as the technology domains further help in the growth of the North America AI in drug discovery market.

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