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Applications of Artificial Intelligence in Engineering and Science

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DESCRIPTION

Artificial Intelligence (AI) is revolutionizing various fields, including engineering and science. With its ability to analyze and interpret vast amounts of data, make decisions, and learn from experience, AI is transforming how engineering and scientific research is conducted, leading to significant advancements in various domains

AI is being used in engineering to predict the maintenance needs of complex systems, such as aircraft, vehicles, and industrial machinery. By analyzing data from sensors and other sources, AI algorithms can detect patterns and anomalies to predict when equipment may fail, allowing for proactive maintenance interventions. This can help prevent costly downtime and reduce maintenance costs.

AI is used in structural engineering to optimize the design of structures such as buildings, bridges, and dams. AI algorithms can analyze various design parameters, such as material properties, structural configurations, and load conditions, to generate optimized designs that are efficient, cost-effective, and meet safety requirements. This can accelerate the design process and improve the overall performance of structures.

AI is used in Computational Fluid Dynamics (CFD) simulations, which are widely used in aerospace, automotive, and other engineering fields to analyze and optimize fluid flow behavior. AI algorithms can improve the accuracy and efficiency of CFD simulations by optimizing mesh generation, reducing computational costs, and enhancing turbulence modeling. This can lead to faster and more accurate simulations, enabling engineers to make better design decisions.

AI is transforming the drug discovery process in the field of pharmaceutical science. AI algorithms can analyze vast amounts of data, including chemical structures, biological interactions, and clinical trial results, to predict the efficacy and safety of potential drug candidates. This can accelerate the drug discovery process and reduce the cost of developing new drugs, leading to the development of more effective and safer medications.

AI is used in environmental science to monitor and analyze environmental data, such as air quality, water quality, and climate data. AI algorithms can analyze large datasets to identify patterns, trends, and anomalies, helping scientists better understand environmental processes, predict environmental changes, and develop strategies for mitigating environmental risks.

AI is used in image and signal processing applications, such as medical imaging, remote sensing, and speech recognition. AI algorithms can analyze large amounts of image and signal data to extract relevant information, such

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as identifying tumors in medical images, detecting objects in remote sensing data, and transcribing speech. This can improve the accuracy and efficiency of data analysis in various fields.

AI is used in robotics and automation to enable machines to perform tasks that typically require human intelligence. AI algorithms can enable robots to perceive, reason, and act in complex and dynamic environments. This has applications in fields such as manufacturing, logistics, agriculture, and space exploration, where robots can perform tasks more efficiently, accurately, and safely.

AI is used in energy management to optimize the generation, distribution, and consumption of energy. AI algorithms can analyze data from various sources, such as weather data, energy demand data, and grid data, to optimize energy production and consumption, reduce energy waste, and improve energy efficiency. This can lead to significant cost savings and environmental benefits.

AI is transforming the transportation and mobility sector by enabling autonomous vehicles, optimizing traffic flow, and improving transportation systems' efficiency. AI algorithms can analyze data from various sources, such as traffic sensors, GPS, and weather data, to optimize traffic flow, predict traffic congestion, and enable autonomous vehicles to navigate safely and efficiently. AI is used in engineering and science to analyze vast amounts of data and make informed decisions.