Abstract

ANN For Power Management

Artificial Neural Networks (ANNs) have emerged as a transformative technology in the field of power management, offering significant advancements in the efficiency, reliability, and sustainability of modern power systems. The inherent ability of ANNs to model complex, nonlinear relationships makes them particularly well-suited for addressing the multifaceted challenges of power management.
In power flow analysis, ANNs provide robust solutions for modeling high-dimensional electric networks, accommodating the intricate interdependencies and dynamics of power grids. By utilizing historical and real-time data, ANNs can predict power consumption patterns with high accuracy, enabling utilities to optimize load distribution and enhance grid stability. This predictive capability is crucial for balancing supply and demand, especially in the context of integrating renewable energy sources such as solar and wind power, which are inherently variable and intermittent.

Demand forecasting is another critical area where ANNs excel.ANNs, on the other hand, can learn from vast datasets, identifying underlying patterns and trends that drive consumption behavior. This improved forecasting accuracy allows for better planning and management of energy resources, reducing the reliance on fossil fuels and minimizing operational costs.
Furthermore, ANNs play a pivotal role in fault detection and predictive maintenance. By analyzing sensor data and operational metrics, ANNs can identify anomalies and predict potential failures before they occur. This proactive approach to maintenance enhances the reliability of power systems, reduces downtime, and extends the lifespan of critical infrastructure.

References:

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