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https://github.com/noyanika-vattathara/CS3-DS4002/tree/main

Using Renewable Energy Patterns to Forecast Changes in Fossil Fuel Usage

Since the Industrial Revolution, fossil fuels like coal, oil, and natural gas have played a major role in powering technological, economic, and social development. At the same time, this dependence comes at a cost: fossil fuels are the largest driver of global climate change and cause millions of premature deaths each year through local air pollution. In recent decades, lower-carbon energy sources such as nuclear and renewable power have become more readily available and are increasingly emphasized as alternatives to fossil fuels, especially as the impacts of climate change grow more severe and immediate. Despite this, fossil fuels remain the dominant source of energy in the U.S. and worldwide.

As renewable technologies expand, it is uncertain whether they are actually reducing fossil fuel dependence or just supplementing total energy demand. This issue is central to US energy security, as domestic consumption that outpaces production can increase reliance on imports and deepen resource strain.

The U.S. Energy Information Administration (EIA) is seeking a data scientist to analyze nearly 50 years of monthly national energy data and evaluate whether renewable energy patterns can help predict fossil fuel production and consumption. Your task is to develop two complementary forecasting approaches: one rooted in time-series methods and one based on machine-learning techniques. Your final deliverable should communicate what these approaches reveal about the relationship between renewable energy and fossil fuels in the United States. These insights will be used to inform national decisions on energy planning, climate strategy, and infrastructure investment.