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GROUP PROJECT PLAN BY GROUP B

A DATA SCIENCE APPROACH TO FORECAST ELECTRICITY DEMAND IN AUSTRALIA

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Abstract

Sample Text

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# 1 Introduction and Motivation

Electricity is a fundamental form of energy resulting from the existence of charged particles (such as electrons and protons) and their interactions. It is a versatile and widely used source of power that plays a pivotal role in modern society. Produced through various means, including fossil fuels, nuclear reactions, and renewable sources, electricity is transmitted through power grids to homes, businesses, and industries. The development of electrical infrastructure has transformed industries, communication, and daily life, contributing to global progress, and shaping the way we live and work. Therefore, it is critical for electricity providers to maintain the correct supply to consumers. A constant supply of electricity is not as simple as we think because the demand for electricity fluctuates based on many factors, making it challenging to precisely forecast consumption patterns (Panesar & Wang, 2003). Some of the most common factors that contribute to fluctuating demands are:

* Weather
* Special events
* Industrial and Commercial activities
* Technological advancements
* Economic factors
* Unforeseen events

Due to the complex interplay of these factors, electricity demand forecasting involves a degree of uncertainty. Utilities and energy planners use historical data, advanced modelling techniques, and real-time monitoring to improve accuracy, but the inherently dynamic nature of the factors mentioned makes it challenging to predict demand with absolute certainty. Advances in technology and data analytics continue to refine forecasting methods and enhance the reliability of electricity demand predictions.

The aim of the project is to help our client Energy Australia, an Electricity supplier who has the Retailer Reliability Obligation (RRO). RRO is a national regulatory requirement for electricity retailers to secure on-demand electricity supplies, including by investing in electricity generation, to meet their share of demand when the grid is under pressure. (State of NSW; Department of Planning, Industry and Environment (DPIE), 2019). To meet RRO requirements, Energy Australia wants to be able to forecast electricity demand at least a year ahead of today. This will help them plan long term power supplies, short term delivery schedules, and determine sources of imbalance due to over or under supply of electricity (Panesar & Wang, 2003).

Karunya – Comments (for discussion)

Options for who is our client –

* Utility Company
* Government Agency
* Energy Planners
* Researchers
* Environmental advocates
* Consumers
* Investors
* Tech providers

Options for what is the question is we are trying to answer –

* Utility company needing forecast for future resource planning
* Guide to allow future investments in new infrastructure such as power plants, transmission lines, distribution networks
* Forecasts could assist grid operators in making real-time decisions to balance supply and demand, prevent overloads, and ensure a consistent power supply
* Governments and regulatory bodies use energy demand forecasts to develop policies and regulations that address current and future energy needs

# 2 Brief Literature Review

A brief literature review of electricity demand forecasting reveals that there are multiple methods available to predict demand.

There is a growing trend toward employing machine learning techniques, including neural networks, support vector machines, and decision trees, to enhance forecasting accuracy. These approaches excel in capturing non-linear relationships, handling large datasets, and adapting to changing conditions. In the study conducted by CSIRO, they have used smart metering and weather data to develop machine learning models that provide hour-ahead forecasts of aggregate demand for regions of geospatially proximate houses. (Nguyen & Berry, 2019)

# 3 Methods, Software and Data Description

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# 4 Activities and Schedule

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<Insert Image of Gantt Chart>

References

# Panesar, S. S. & Wang, W., 2003. Electricity Demand Forecasting Using Neural Networks. Springer, Berlin, Heidelberg, Volume 2690, pp. 826-834.

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