IST 687

Approaches to Energy Demand Forecasting and Reduction

Group 2: The Revengers
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Introduction

Background

eSC provides electricity to residential areas in South Carolina and parts of North Carolina.

Concern

Due to global warming, there's an anticipated increase in energy demand, especially during the hot months of summer, risking blackouts.

Objective

Utilize data to understand energy usage patterns and develop strategies to reduce peak demand without expanding infrastructure.

Data Overview

1 Static House Data

Information on 5,000 single-family houses including size, age, and structure details.

2 Energy Usage Data

Hour-by-hour energy consumption data for each house.

3 Meta Data

Descriptions of the fields in the house and energy data.

4 Weather Data

Hourly weather data for each county.

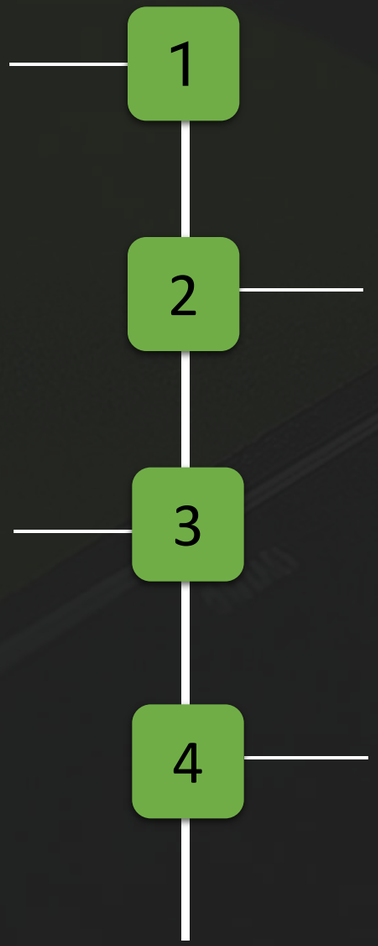
Project Scope

Data Integration

Merge datasets based on common identifiers to create a comprehensive view of energy consumption patterns across different variables.

Predictive Modeling

Develop and validate linear regression model to forecast energy consumption using historical data and predictive analytics.



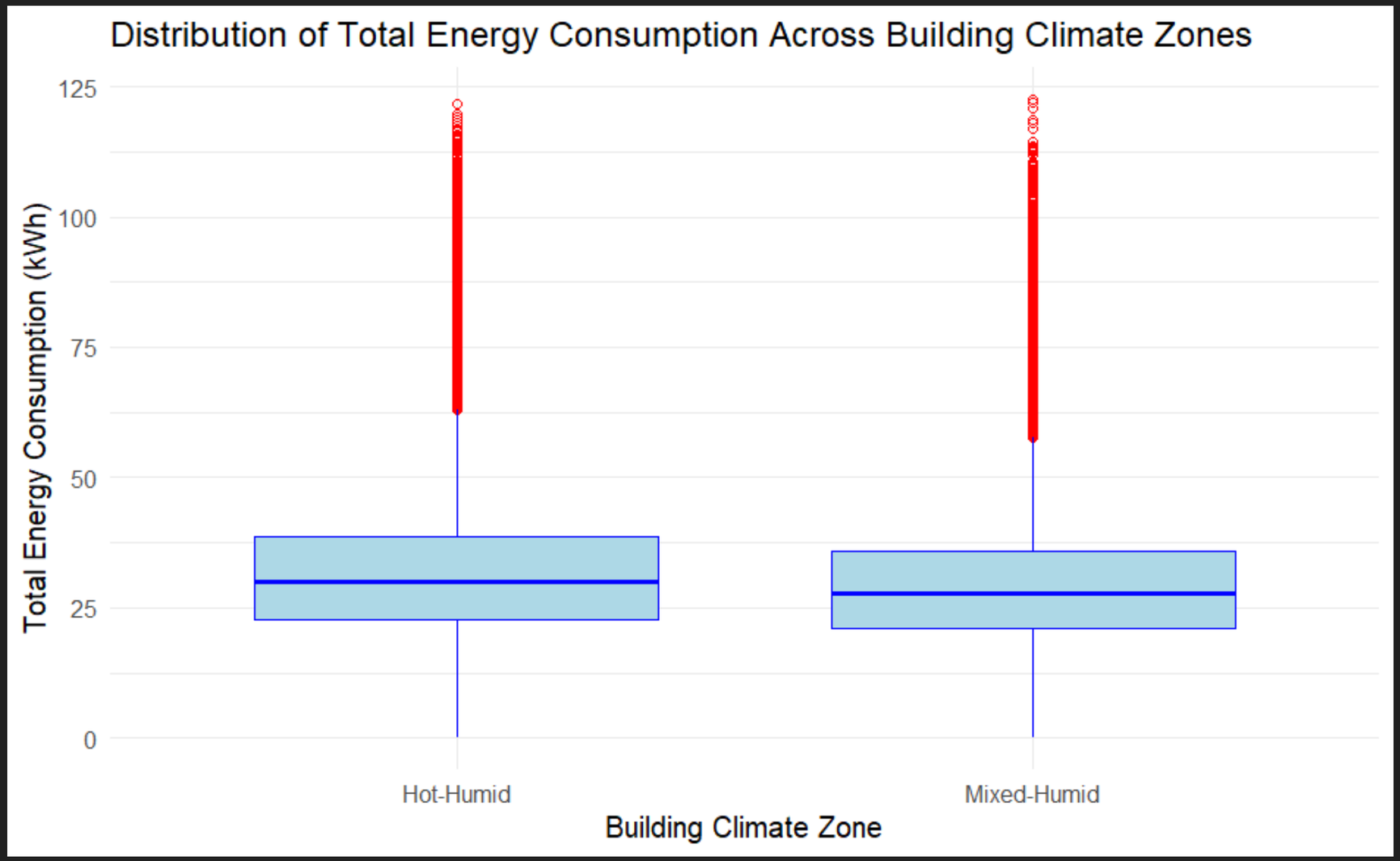
Exploratory Data Analysis

Utilize statistical and graphical techniques to uncover underlying patterns, trends, and outliers in energy usage data.

Strategies for Demand Reduction

Implementation of incentive programs for energy-saving appliances, peak hour pricing, community energy awareness campaigns.

Visualization



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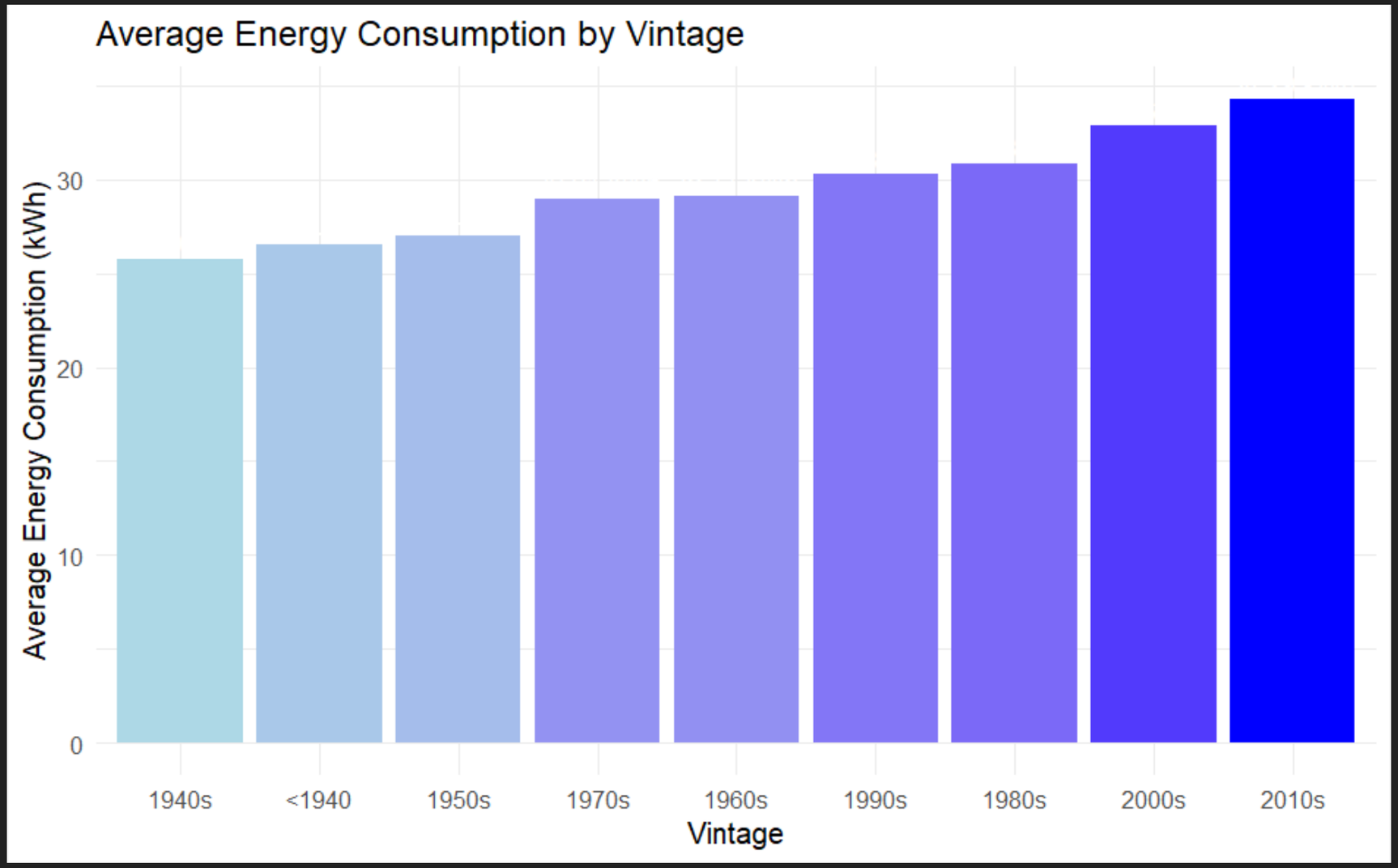

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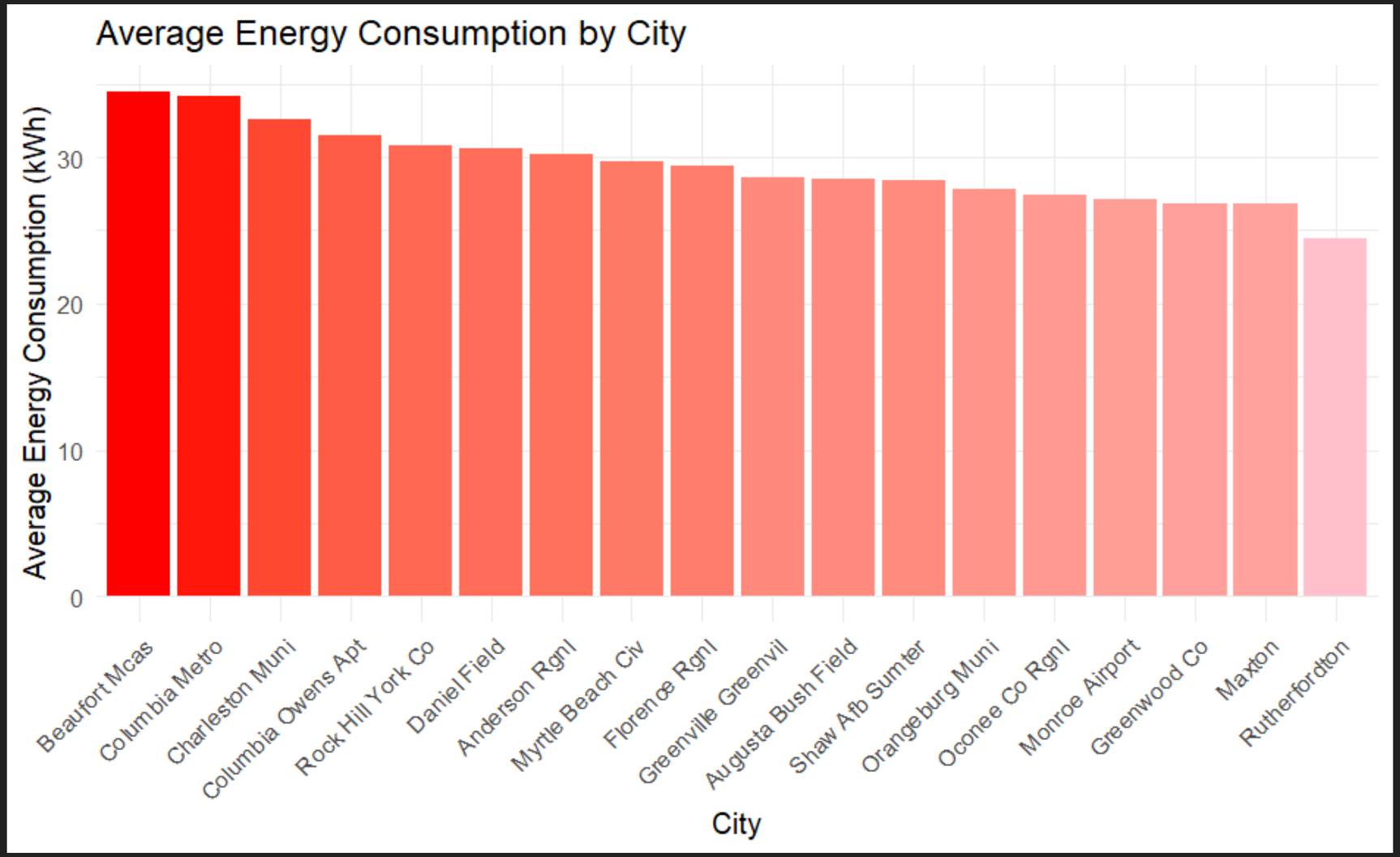

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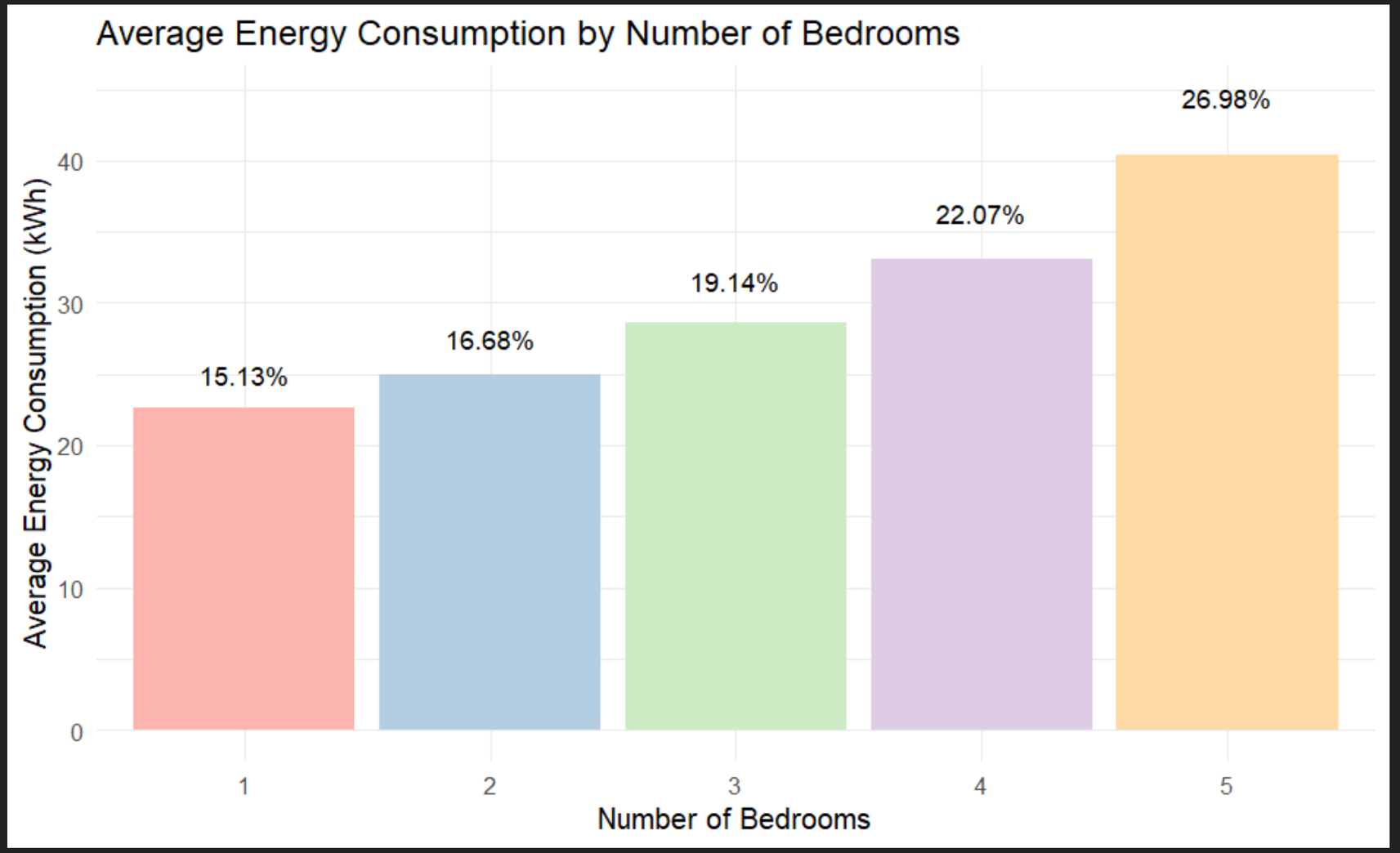

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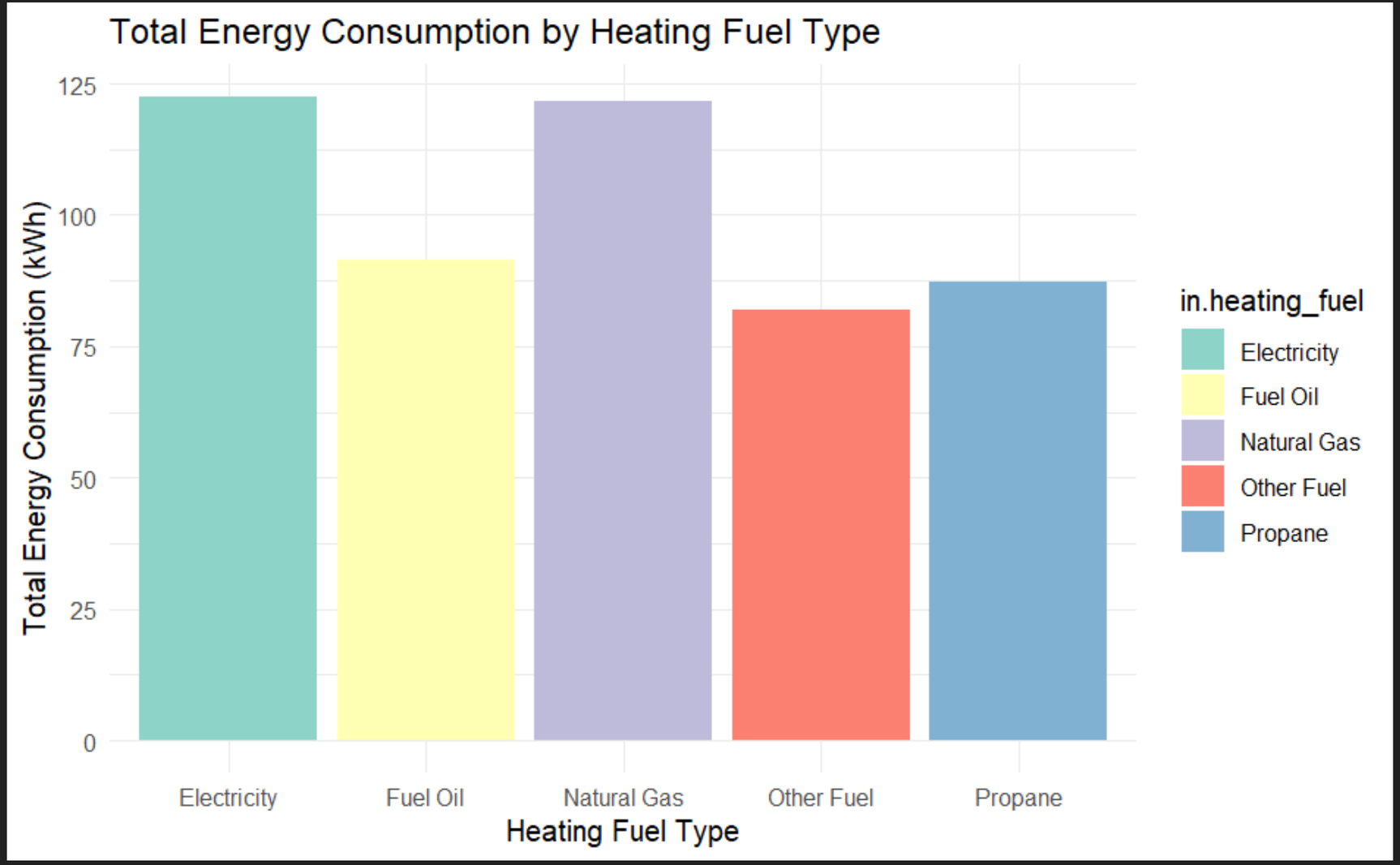

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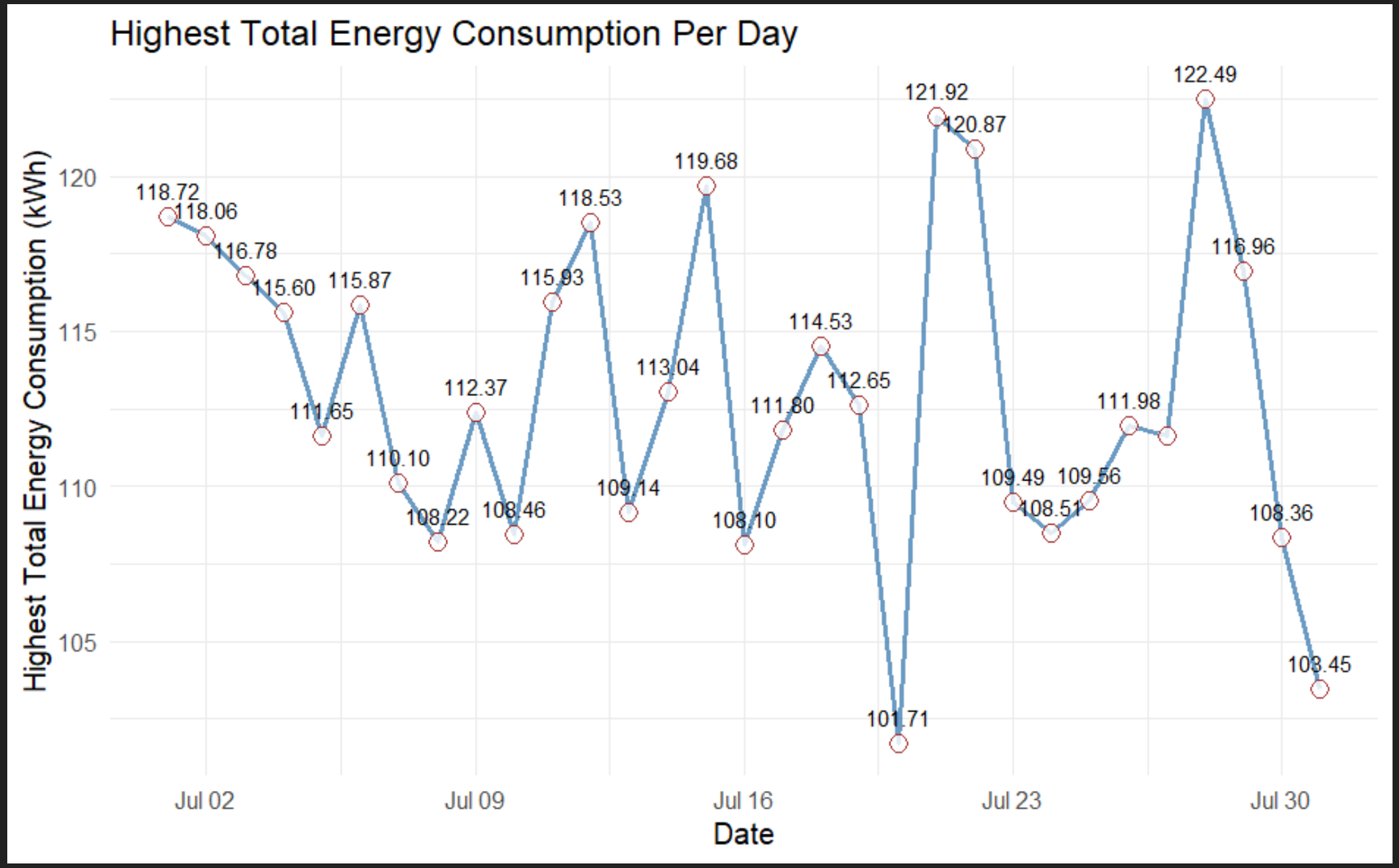

Predictive Modeling

Linear Regression Model

- Linear regression model is used to predict the dependent variable, 'day_total_energy', using all other available predictors in the dataset.
- Adjusted R-squared: 0.8721
- Root Mean Squared Error (RMSE): 4.689
- Mean Absolute Percentage Error (MAPE): 13.90 %

Strategies for Demand Reduction

Integration of IoT Devices for Enhanced Energy Management

Optimize energy usage and monitor it in real-time by incentivizing the adoption of IoT-enabled devices and systems.

Peak Hour Pricing

Implement variable pricing to encourage shifting energy use to off-peak times.

Community Energy Awareness Campaigns

Enhance community engagement in energy conservation through educational programs, partnerships, and media campaigns.

Incentive Programs for Energy-Saving Appliances

Promote the adoption of energy-efficient appliances through partnerships, subsidies, and targeted marketing efforts.

Thank you for not overfitting your schedule and joining us today !

Questions?