Income impact on gas consumption

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Introduction

As household wealth increases globally, lifestyle upgrades often lead to higher consumption, putting resources under pressure. This raises an important question: does higher income result in greater energy usage, specifically gas consumption? Moreover, does this relationship vary across housing types? This analysis investigates the correlation between income and average gas consumption in different housing types. Understanding this relationship is crucial for driving behavioral changes that reduce gas usage and CO_2 emissions, positively impacting our planet. Hypothesis: households' average gas usage increases when income increases, independent of the housing characteristics.

Methods

To address the question, clustering analysis was performed on average gas consumption and median income data from multiple municipalities to identify patterns and visualize their correlation using regression plots. This examined whether higher income correlates with greater gas usage.

Additionally, two quadratic regression models were created to assess if this correlation varies across housing types ("detached" and "corner"). Quadratic models were chosen to capture non-linear relationships between . Model accuracy scores were calculated to ensure the reliability of the results. Five independent variables were used in the model to predict the average gas consumption.

Results

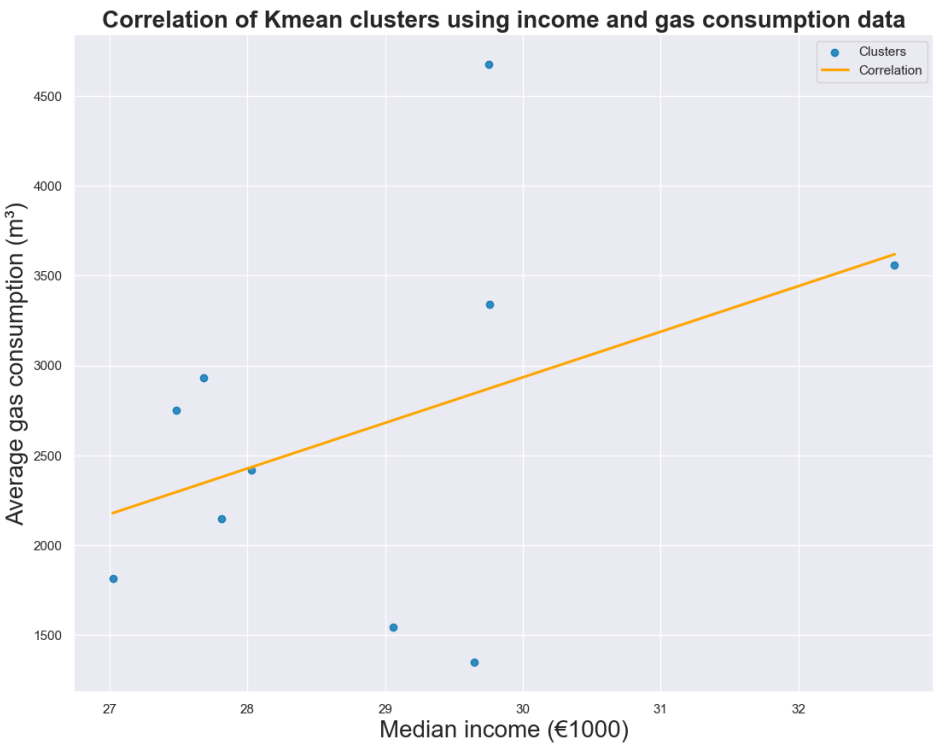

Figure 1 Regression plot of clusters for median income and average gas consumption data

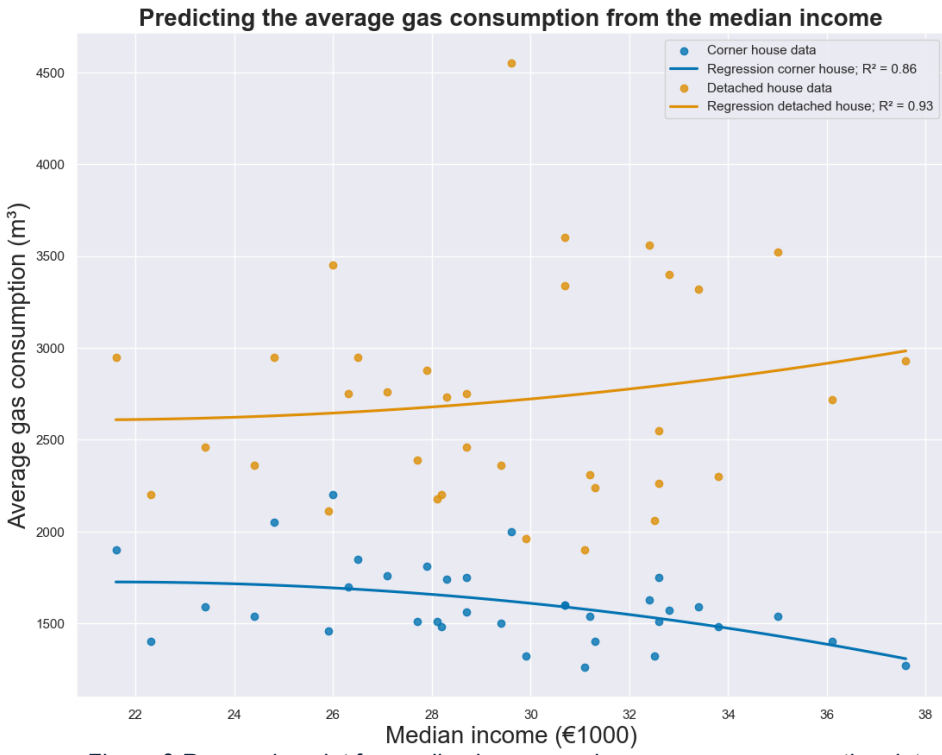

Figure 2 Regression plot for median income and average gas consumption data in different housing types

As shown in Figure 1, there is a positive linear correlation between the median income of households and their average gas consumption.

According to Figure 2, which shows the quadratic regression predictions, the regression model for the corner house indicates a negative correlation between median income and average gas consumption. In contrast, the regression model for detached houses shows a positive correlation between the two variables.

Discussion

The regression, and clustering models provide a robust overview of the correlation between income and gas consumption. The specific quadratic regression model zooms in on the relationship by focusing on different housing types. This analysis did not represent the real-world, as there are many variables that could influence the gas usage such as the energy efficiency of the home and the lifestyle of the household. Including these variables with more complex data analytics techniques such as machine learning could provide a clearer understanding, with which we can take more accurate actions.

Conclusion

The results in Figure 1 support the idea that, on average, higher income is associated with higher gas consumption. However, Figure 2 shows that this general correlation does not hold across different housing types. In particular, the average gas consumption does not consistently increase with income, regardless of housing type. Therefore, the hypothesis is refuted, as the relationship between income and gas consumption is not universal across housing types. A reliable conclusion is given because of the available accuracy scores.