**DSA 210 FINAL REPORT -  RELATIONSHIP BETWEEN CLIMATE AND AGRICULTURAL PRODUCTIVITY**

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**Summary**

This project investigates the effects of key climate factors, especially temperature and rainfall, on crop production across six countries: Australia, Brazil, Germany, India, Nigeria, and the USA. Using historical data, we performed data exploration, statistical tests, and regression analyses to understand these relationships. Results show a generally positive link between temperature and production, while rainfall’s effect varies by location.

**Background and Purpose**

With climate change threatening food supplies worldwide, it's crucial to understand how weather variables influence farming output. This study focuses on quantifying how temperature and rainfall changes affect crop yields in different countries, aiming to provide insights that could help farmers and policymakers adapt.

**Data and Methods**

Data was sourced from global databases like NOAA and FAOSTAT, spanning several decades and focusing on six countries with diverse climates. We cleaned and merged datasets, visualized data trends, tested statistical significance of relationships, and built regression models to predict production based on climate factors.

**Main Observations**

* Temperature generally has a clear and positive impact on crop production.
* Rainfall effects are less consistent; only Brazil showed a statistically significant negative effect, possibly due to excess precipitation risks.
* Regression results suggest temperature is the stronger driver of production changes, with rainfall playing a variable role.
* Model predictions align well with actual production in most countries, but deviations suggest other factors like farming practices and technology also matter.

**Interpretation**

The findings highlight that climate impacts on agriculture are complex and location-dependent. While warming may boost yields in some places, water availability and management are crucial. Differences between predicted and real production emphasize the need to include socioeconomic and technological variables in future analyses.

**Final Thoughts**

This project demonstrates the importance of climate variables in shaping agricultural productivity. It stresses that strategies to tackle climate change impacts must be tailored to local conditions, considering both temperature and rainfall influences to sustain food security.

**Sources**

* NOAA Climate Data
* FAOSTAT Agricultural Data
* Relevant scientific publications

**Additional Materials**

* Python notebooks with all analyses
* Extra charts and tables