Weather Comparison Across Australian Cities

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1 Executive Summary

This report analyzes weather patterns across major Australian cities using the Rattle weather dataset. Key variables such as temperature, rainfall, and humidity,… were compared to uncover regional climate differences. The findings reveal distinct climate characteristics aligned with Australia's diverse geography. These insights can support planning in climate planning, tourism and lifestyle choice, and future research.

2 Introduction

Australia is known for its diverse climates, ranging from tropical in the north to temperate in the south. This variability impacts agriculture, urban planning, and public health. In this report, we compare weather characteristics across eight Australian cities using daily data from the weatherAUS dataset. The selected cities represent different climate zones, including tropical (Darwin), arid (Adelaide), and temperate (Melbourne, Hobart). The dataset includes over 10 years of weather observations, providing a robust basis for analysis. Key variables of interest are temperature, rainfall, humidity, presurre. These metrics reflect both short- and

long-term climate trends. Through visualization and descriptive statistics, we uncover patterns that align with geographical locations. This work aims to support informed, location-specific decision-making. All analysis is reproducible using R and Quarto.

3 Discussion

This analysis highlights the significant climatic diversity across Australian cities:

- **Rainfall Patterns**: Cities in tropical and coastal regions, such as Cairns and Darwin, receive the highest rainfall, confirming the impact of geography on precipitation. The consistent presence of coastal cities in the top 10 list indicates the influence of sea moisture and oceanic weather systems.
- **Temperature and Humidity**: Tropical cities (Darwin, Cairns) are not only warmer but also experience less temperature variability. This is typical for equatorial and desert climates. In contrast, temperate cities like Melbourne and Hobart are cooler and have more fluctuating weather, influenced by changing weather fronts.
- **Air Pressure Observations**: Most cities show similar atmospheric pressure, except Darwin, where lower pressure may contribute to the region's tropical climate and higher rainfall.
- **Temperature Distribution**: The boxplot reinforces how geography affects temperature: inland cities are hot and stable, while southern cities are cooler and more variable. Outliers and wider spreads reflect occasional weather extremes in cities like Melbourne and Sydney.

4 Conclusion

In summary, the climate of Australian cities varies significantly by location. Northern and inland areas such as Darwin and Alice Springs are warmer and more stable in temperature, while southern and coastal cities like Melbourne, Hobart, and Sydney exhibit cooler, more variable weather. High rainfall is concentrated in tropical and coastal regions, confirming expected climate zones. These findings align with known climate patterns across the country.

5 Recommendations

- **For Climate Planning**: City planners and infrastructure developers should consider local rainfall and temperature variability when designing drainage systems, buildings, and energy systems—especially in high-rainfall cities like Cairns and Darwin.

- **For Tourism and Lifestyle Choices**: Tourists and residents seeking stable warm weather may prefer Darwin or Alice Springs. Those sensitive to temperature variability may find southern cities less comfortable.
- **For Future Research**:
  - **Incorporate Time Dimension**: Explore seasonal or monthly trends to observe how rainfall and temperature vary over time.
  - **Visualise More Variables**: Add plots for humidity, temperature, or pressure to deepen comparison across cities.
  - **Explore Extreme Events**: Analyse maximum rainfall or temperature to assess weather extremes and risks.
  - **Forecast rain tomorrow**: Predict whether it will rain tomorrow based on other variables from previous records.