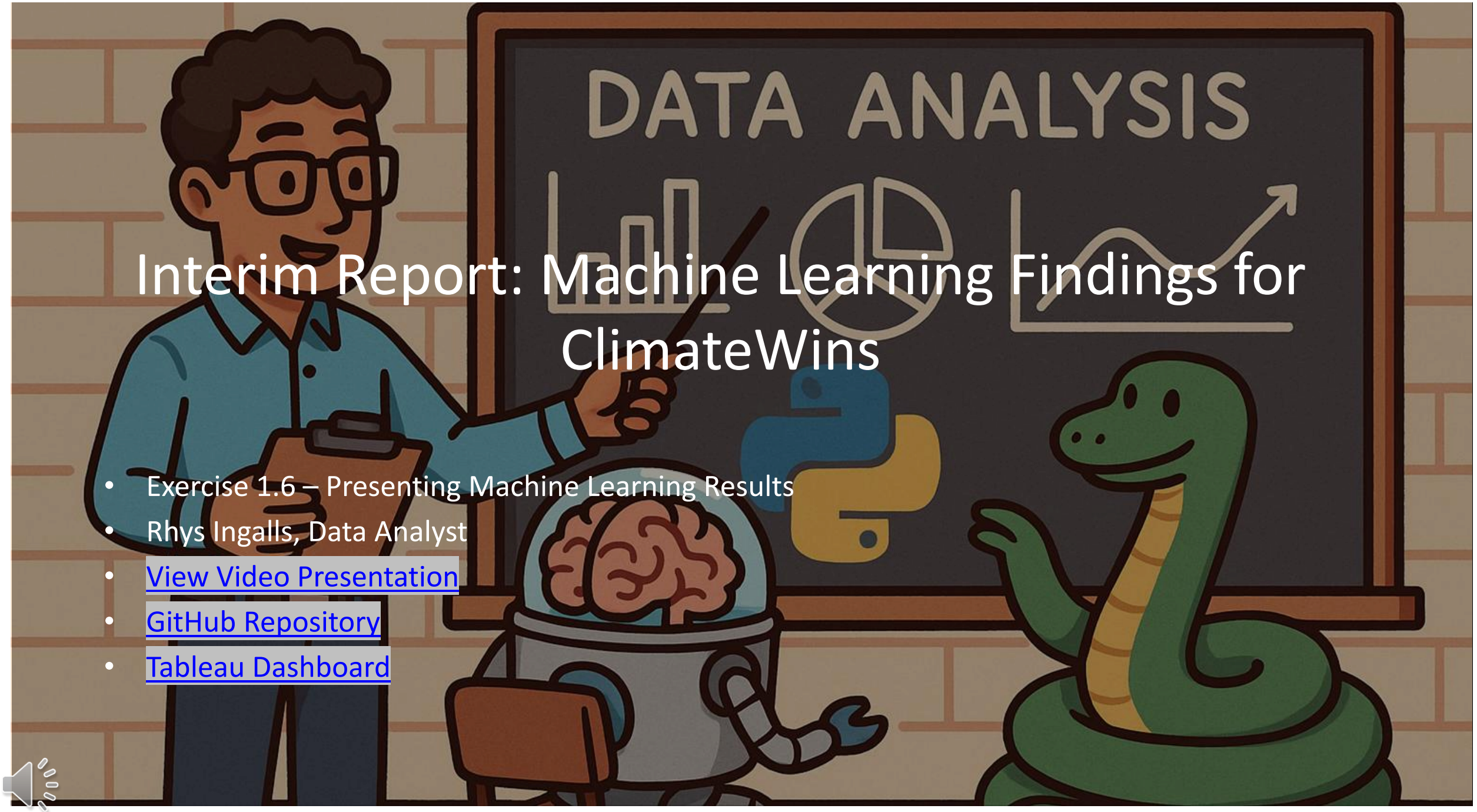
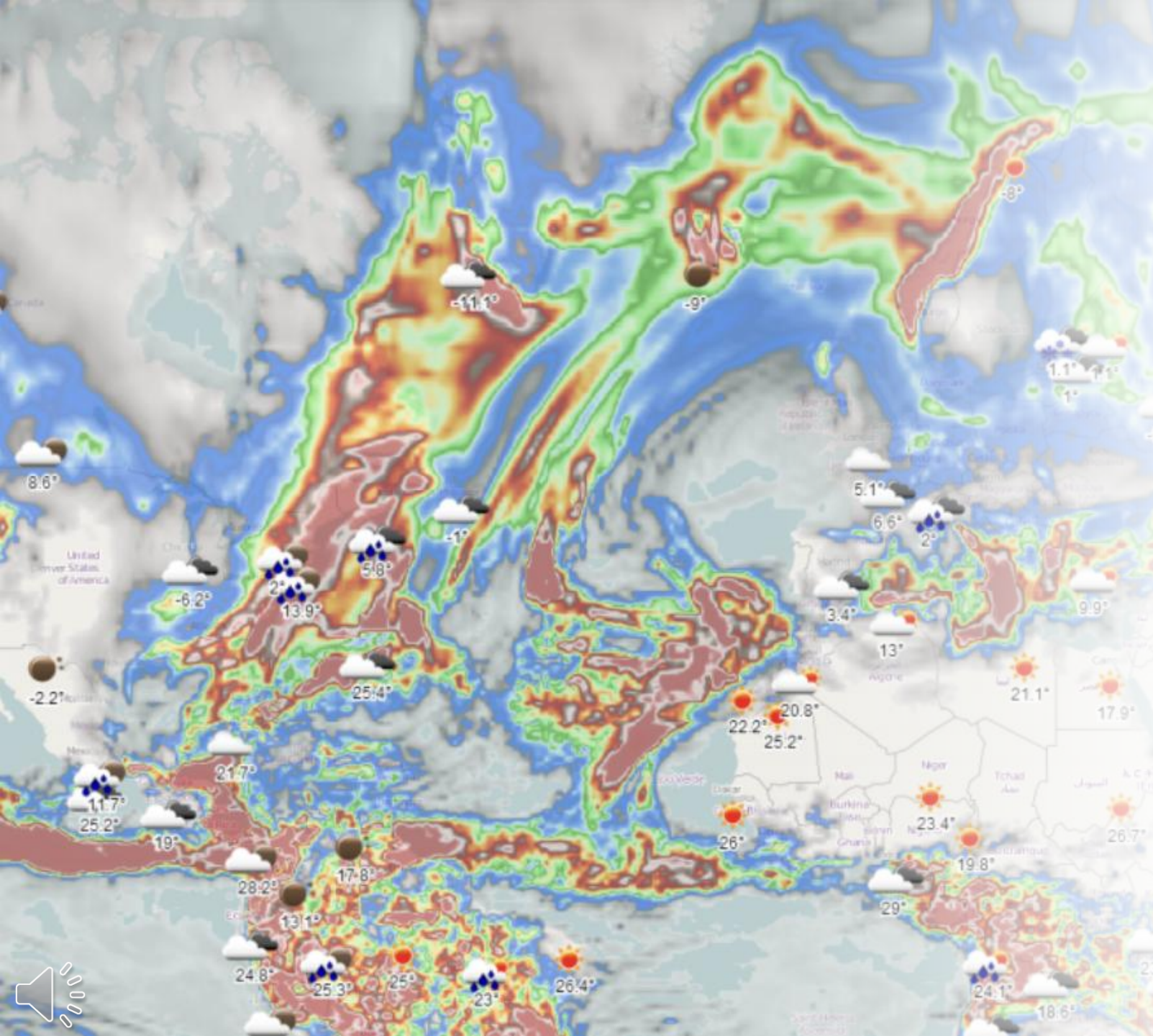


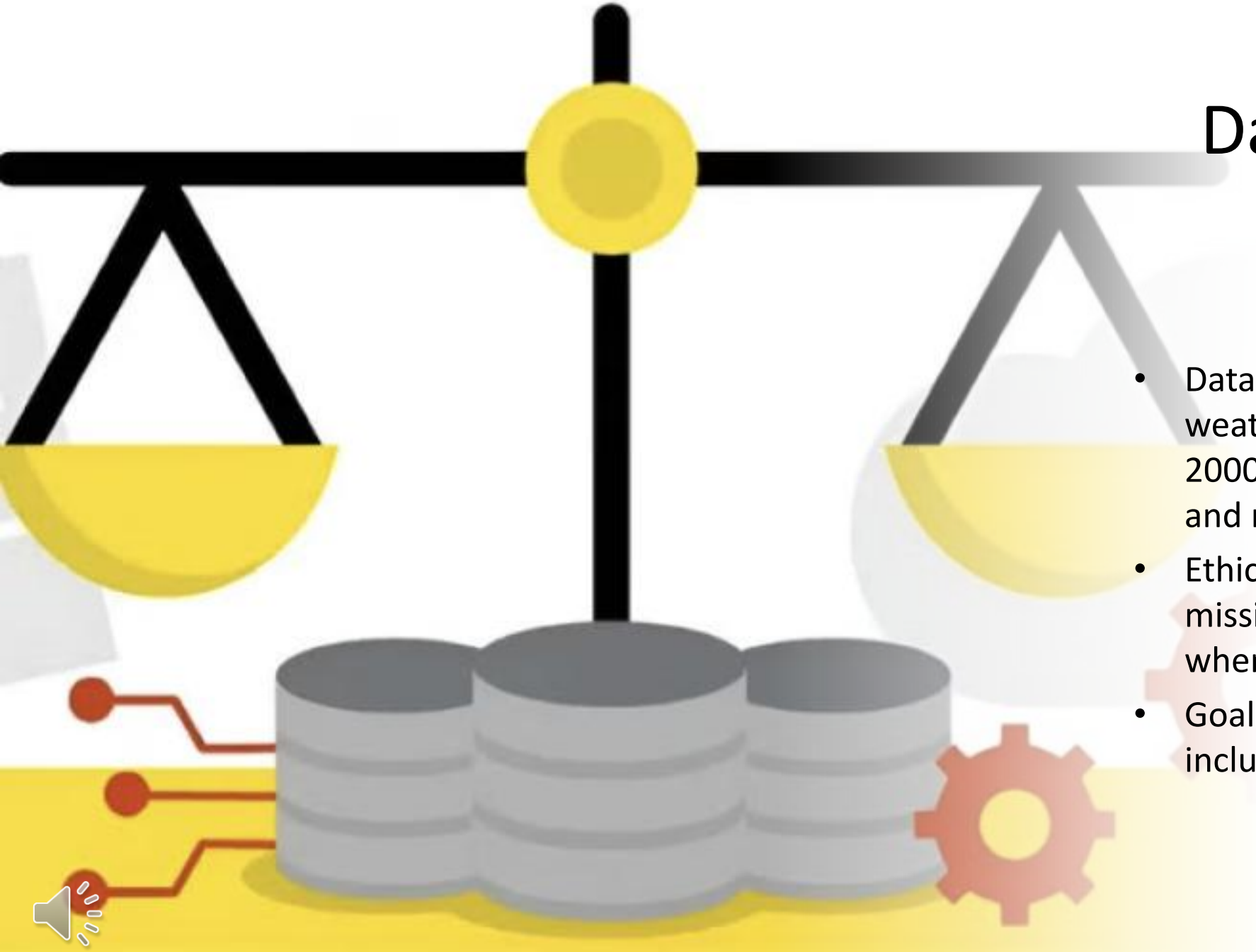
Interim Report: Machine Learning Findings for ClimateWins

- Exercise 1.6 – Presenting Machine Learning Results
- Rhys Ingalls, Data Analyst
- View Video Presentation
- GitHub Repository
- Tableau Dashboard



Project Overview

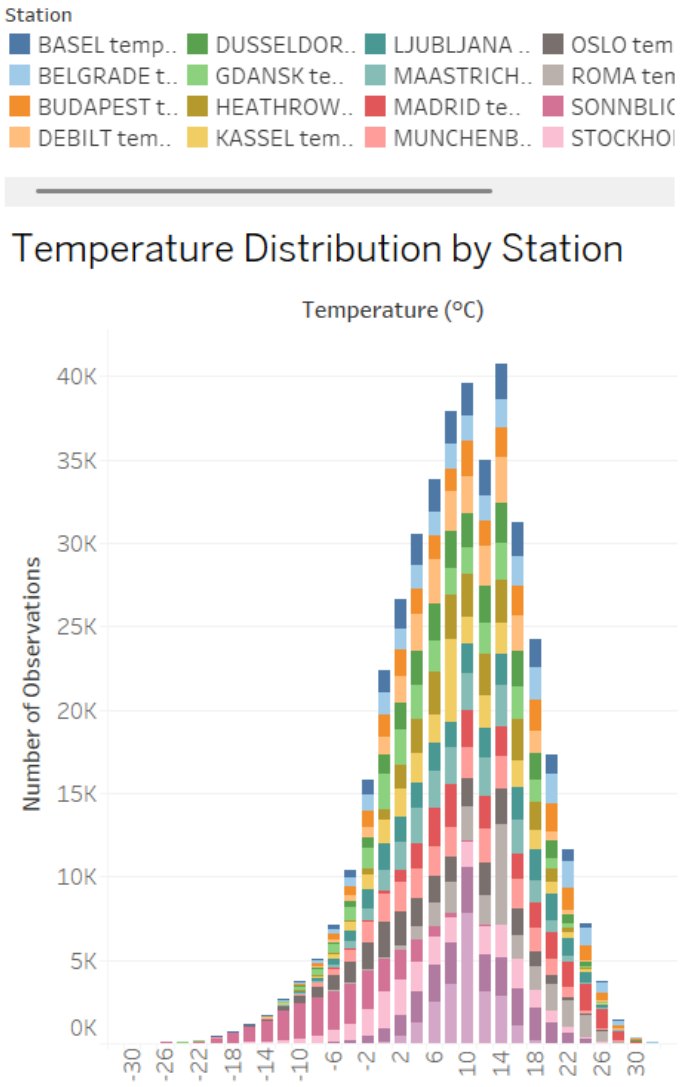
- ClimateWins wants to better anticipate weather changes to guide sustainable business decisions and resource planning.
- Goal: Help ClimateWins predict climate change impacts using machine learning.
- My Role: Evaluate supervised learning models for weather prediction.
- Outcome: Recommend the best approach for accurate, ethical forecasting.

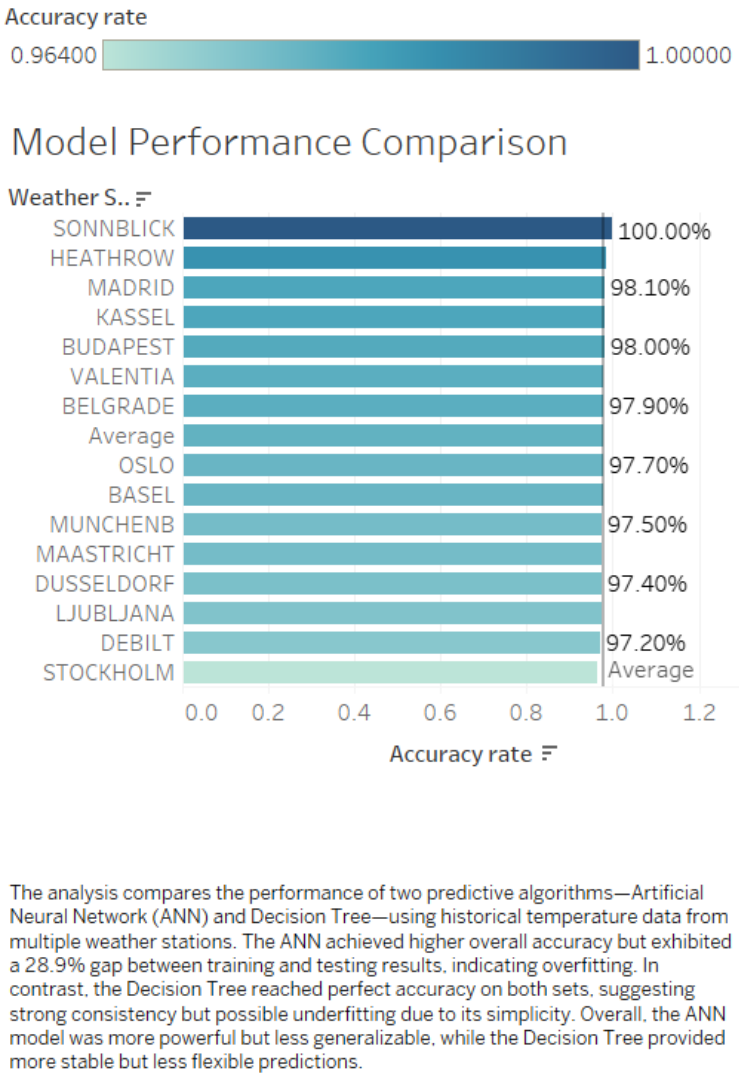


Data & Ethics

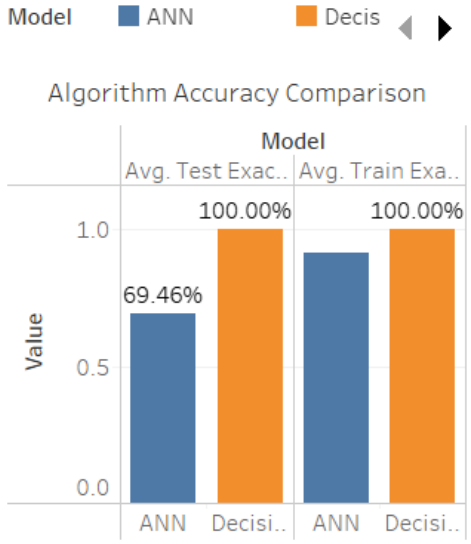
- Data Source: 18 European weather stations (1970s–2000s) with temperature, wind, and radiation data.
- Ethical Focus: Regional bias, missing data, and privacy risks when linking regional data.
- Goal: Ensure fairness and inclusivity in model design.

Tableau Dashboard

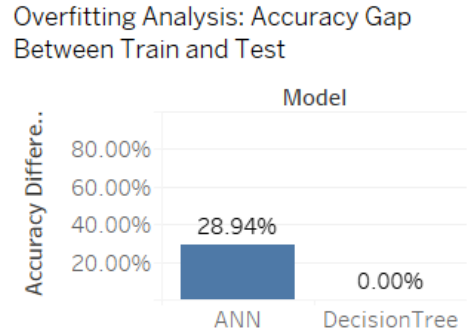




The analysis compares the performance of two predictive algorithms—Artificial Neural Network (ANN) and Decision Tree—using historical temperature data from multiple weather stations. The ANN achieved higher overall accuracy but exhibited a 28.9% gap between training and testing results, indicating overfitting. In contrast, the Decision Tree reached perfect accuracy on both sets, suggesting strong consistency but possible underfitting due to its simplicity. Overall, the ANN model was more powerful but less generalizable, while the Decision Tree provided more stable but less flexible predictions.



ANN achieved higher accuracy on training data but showed signs of overfitting.

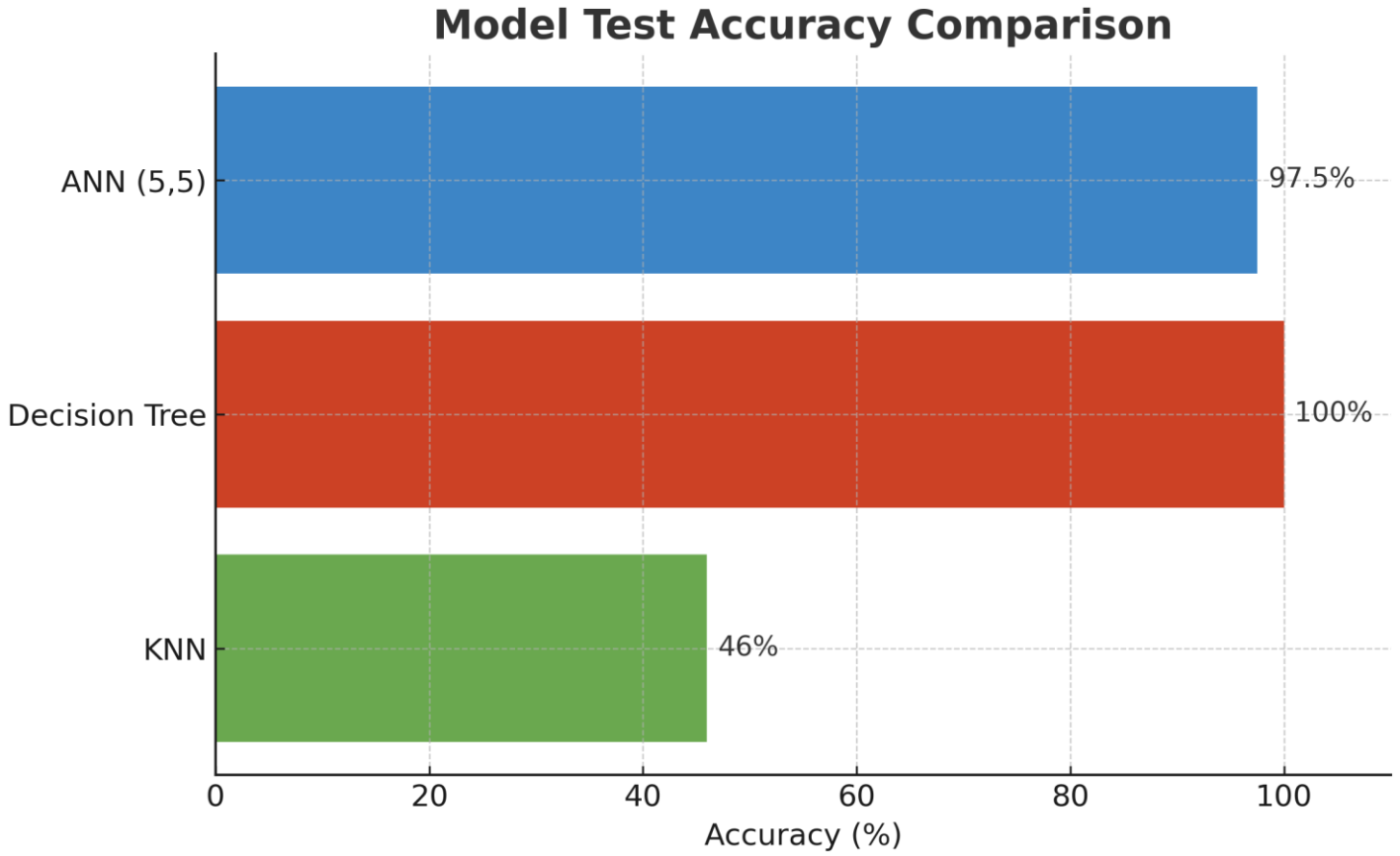


Decision Tree maintained consistent results across train and test sets, indicating better generalization.

Our models taught us that not all machine learning approaches handle real-world weather data the same way — and understanding why helps ClimateWins choose wisely.

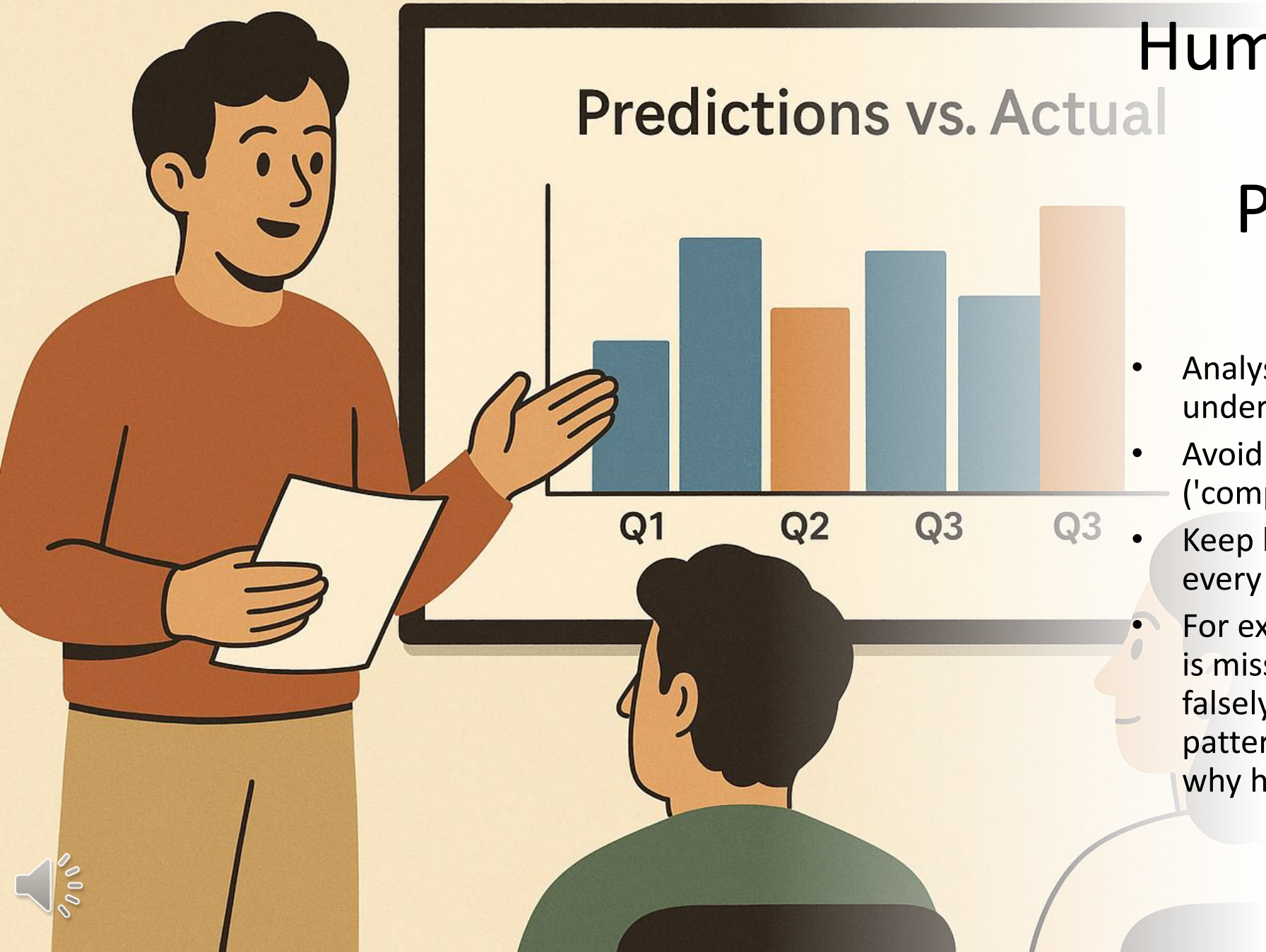
Models Tested

- KNN: 46% test accuracy – weak generalization.
- Decision Tree: 100% accuracy – overfit.
- ANN (5,5): 97–98% accuracy – best model.



Insights & Interpretation

- Machine learning can recognize weather trends but must be interpreted carefully.
- High accuracy ≠ reliable predictions.
- Human analysis ensures data balance and context.
- ANN model provides stability without overfitting.



Human Oversight & Bias Prevention

- Analysts detect underrepresented data regions.
- Avoid automation bias ('computer knows best').
- Keep human-in-the-loop for every decision stage.
- For example, if one region’s data is missing, the model might falsely assume consistent patterns everywhere — this is why human review remains vital.

Recommendations

- Adopt the scaled ANN (5,5) as baseline model.
- Expand dataset for rural and extreme-weather regions.
- Implement fairness and bias checks.
- Develop stakeholder dashboards for visual results.
- Continue analyst review of model updates.

Conclusion

- Machine learning empowers ClimateWins to forecast responsibly.
- Ethical awareness and human insight remain essential.
- Next step: apply unsupervised learning for deeper pattern discovery.