Name(s) Jason C. Wang	Project Number **J0911**

Project Title

How Accurate Are 10 Day Weather Forecasts? Can Similar Cities Foreshadow Future Weather?

Abstract

Objectives/Goals
This project answered 3 questions: (1) How accurate are the 10-day forecasts, for Walnut, CA and Boston, MA? (2) What cities have the most similar temperatures to Walnut and Boston, on the same day? (3) What cities have the most similar temperatures 10-days earlier?

Methods/Materials
Forecast Analysis: Every day for 8 months, I took 2 screenshots of my iPhone's 10-day weather forecasts, for Walnut, CA and Boston, MA. Using 516 total screenshots, I compared forecasts versus actual temperatures, and calculated the accuracies of 10-day forecasts.

Similarity Analysis: I downloaded actual daily temperatures from 2013 to 2017 for Walnut, CA and Boston, MA, along with 20 California and 20 East coast cities. (a) I computed the cities with the most similar weather on the same day, and (b) I identified the cities with the most similar weather 10-days earlier.

Results
The next-day forecast only predicts tomorrow's high temperature exactly ~27% of the time. The one-week forecast drops to less than ~10% accurate, and the 10-day forecast is only around ~6% accurate with wide variability. The cities most similar to Walnut, CA and Boston, MA matched temperatures ~13% on the same day. Cities most similar 10-days earlier foreshadowed temperatures ~5% of the time, almost as accurate as 10-day weather forecasts.

Conclusions/Discussion
Weather forecasting is extremely difficult. Surprisingly, tomorrow's high temperatures are exactly correct only a quarter of the time, and the 10-day forecast is barely better than random. There are cities that can foreshadow future weather as well as the 10-day forecast, however, it is difficult to know which city in any given year. With long-range forecasts, random variability resulted in statistical uncertainties, just as finding similar cities resulted in geographic uncertainties.

Summary Statement

Over 8 months, I took daily screenshots of 10-day weather forecasts to measure their accuracy for Walnut, CA and Boston, MA, and then found cities that foreshadowed their high temperatures as well as the long-range weather forecast.

Help Received

My father taught me how to use Microsoft Excel to analyze and visualize data.