Summary Sheet

From breaking news in the Weather Channel to the frontline of researches in climate change, the changing levels of CO2 in the air constantly attracts billions of views, for the trends in concentration of CO2 directly or indirectly affect the world in multiple ways. To take stronger control of economic fluctuations and new policies, we are in urgent need for accurate predictions of CO2 levels. In this paper, by optimizing the correlation between influential factors and CO2 concentration and that between CO2 levels and temperature, we built two sets of models in an effort to demonstrate our own perspective on the problems.

Based on common understandings to the requirements, the team first established a prime goal: to predict future CO2 concentration in the atmosphere and its influence on temperature with algorithms that correspond with historical records.

Before our attempt to answer Problem 1, we formed the opinion that the 2004 increase in CO2 concentration ??? based on authorized data available. To predict further changes, we then selected 10 factors that directly influence or reflect the changes in CO2 emission. In the light of simulated projections of factors and the assistance from PCA, available STIRPAT models and ODE, we related factors to the CO2 curve through reducing dimensions, filtrated factors on calculated weights and took human affection into consideration, respectively. Thus, we received three interpretations of the relationship between economy, energy consumption and urbanization and atmospheric CO2 levels. The resulting algorithm output ??? when we input 685 ppm as the CO2 concentration.

At the beginning of Problem 2 solution, we preprocessed the temperature records with Lowess Smoothing and analog the result to a quadratic function. To mimic the original data’s brief periodicity, we composited three sine functions to it and predicted that average land-ocean temperature will complete the 1.25C change in ???, the 1.50C change in ??? and the eventual 2C change in ??? compared to the base period 1951-1980.