Conclusion

To offer our own insight into the controversy, prior to the beginning of data selection, we set a clear direction: to model CO2 concentration and to describe its connection to temperature with multiple methods. Firstly, upon reflecting on previous papers, we selected ten factors that contain the widest range of emission sources. Through regression models and the reliable data provided by UN, we simulated the 10 factors’ changes throughout the century.

Before solving Problem 1, we first pointed out that the sharp increase in 2004 is not major to the largest 10-year average increase up of the 2000s according to the information officially admitted and confirmed accurate. Firstly, with PCA we reduced the 10 variables to 3. And with the following Multivariate Regression, we managed to yield the weight of each original factor. In model 2, we took on Stepwise Regression to select three factors bearing the most irreplaceability and related them with CO2 levels through STIRAPT equation. In the third model, we employed Differential Equation to express artificial feedbacks to the changes, in which ODE was applied to a function of two hand-picked factors, so as to compute the concentration around which human reacts with urgency. Three versions of the relationship were thus created. Accordingly, CO2 levels will not reach 685 before 2050 in any curve and the 2100 CO2 concentration is expected to range from 446 to 650 PPM, the former possessing larger possibility.

We began our solution of Problem 2 with the smoothening of the historical temperature curve through Lowess Smoothing. Due to its similarity to the figure, a quadratic function acts as the base of the projection. After amending the curve with three sine functions to restore the periodicity of original data, we concluded that average land-ocean will have risen 1.25°C by 2028, 1.50°C by 2037 and 2.0°C by 2056. Then, we extended our vision to involve major contributors to the global warming. Factors other than CO2 include CH4, N2O and solar radiation. We applied GRG to compare the extent to which each factor is connected to changes in temperature. To further determine the influence of CO2 to global temperature in quantities, we used Spearman’s coefficient and managed to express their singular connection. It turned out that CO2 is indeed responsible for the majority of global rising, as it ranked the highest in GRG proportion at 0.8 and related with temperature to the same extent using all three models in Problem 1. However, the Spearman’s coefficient goes in separate trends after 2060, indicating the model’s loss of accuracy starting from 2060.