STATS 418 FINAL:
CO_2 CONCENTRATION W/PREDICTIONS

Mark Rahal

6/3/2025

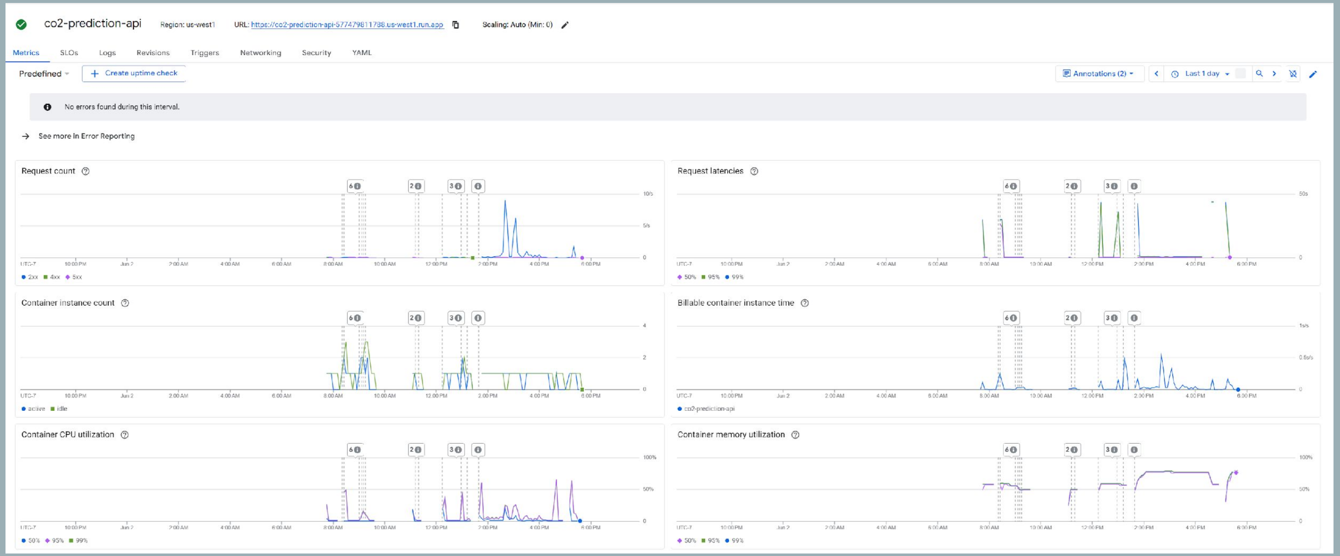
(reusing the same theme - ✨*consistency*✨)

THE MEAT: MODEL API DEVELOPMENT AND DEPLOYMENT 🥩

- Fetched JSON data from RapidAPI
- Created model.R
  - Used `auto.arima()` function from the `forecast` package to find best predictive model per the data.
  - With this function, plotted 10 years of data, combining historical and predicted values.
- Created api.R
  - Created reachable endpoints for each function of the model.R
  - Includes historical/raw data, the prediction generation model, and the plot generation functions.

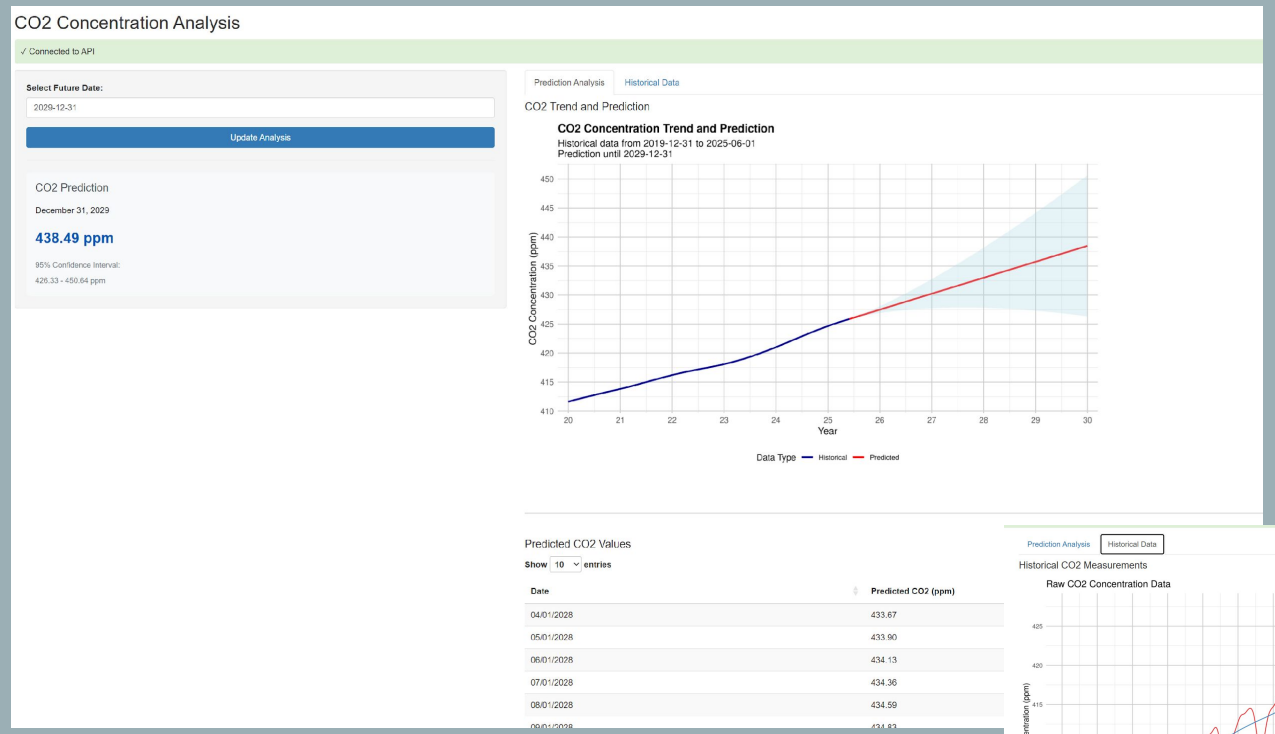
THE MEAT: MODEL API DEVELOPMENT AND DEPLOYMENT 🥩

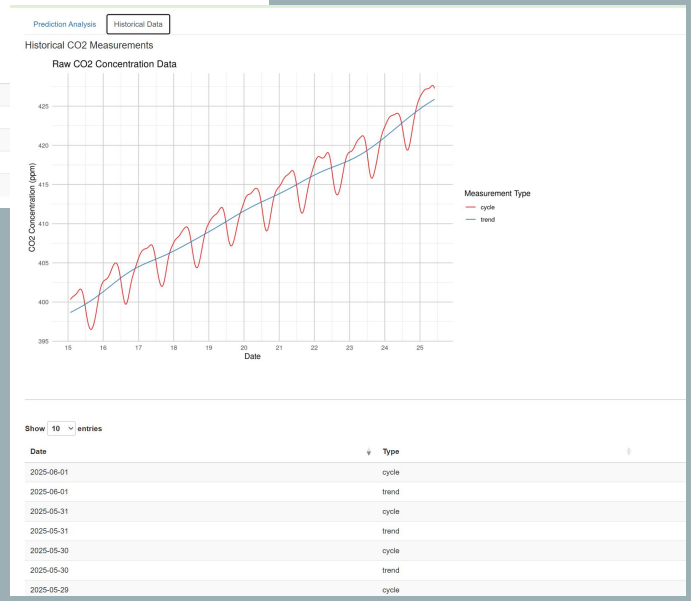
```
PS C:\Users\rahal> curl https://co2-prediction-api-577479811788.us-west1.run.app/co2/trend/plot?prediction_date="2026-06
-02"


StatusCode        : 200
StatusDescription : OK
Content           : {"plot_data":"iVBORw0KGgoAAAANSUhEUgAAC7gAAAcICAYAAACsf4x4AAAACXBIWXMAAC4jAAAuIwF4pT92AAAgAElEQVR4n
                    Ozdd7gkVZn48e8Mwww5CRIVkKSSBVYQUBERBQQDKyq6YMBddc2uu+uqoKvIrqKuif0t5oBZQQERA4gCS5KkggRBouQ4wDDM3N8f
                    59...
RawContent        : HTTP/1.1 200 OK
                    access-control-allow-origin: *
                    access-control-allow-methods: GET, POST, OPTIONS
                    access-control-allow-headers: Content-Type
                    x-cloud-trace-context: fee1e66f932e94f0adeb2222acc5e2ed;o...
Forms             : {}
Headers           : {[access-control-allow-origin, *], [access-control-allow-methods, GET, POST, OPTIONS],
                    [access-control-allow-headers, Content-Type], [x-cloud-trace-context,
                    fee1e66f932e94f0adeb2222acc5e2ed;o=1]...}
Images            : {}
InputFields       : {}
Links             : {}
ParsedHtml        : mshtml.HTMLDocumentClass
RawContentLength  : 189203
```



THE PLATING: SHINY R APP ON SHINYAPPS.IO 🍽️

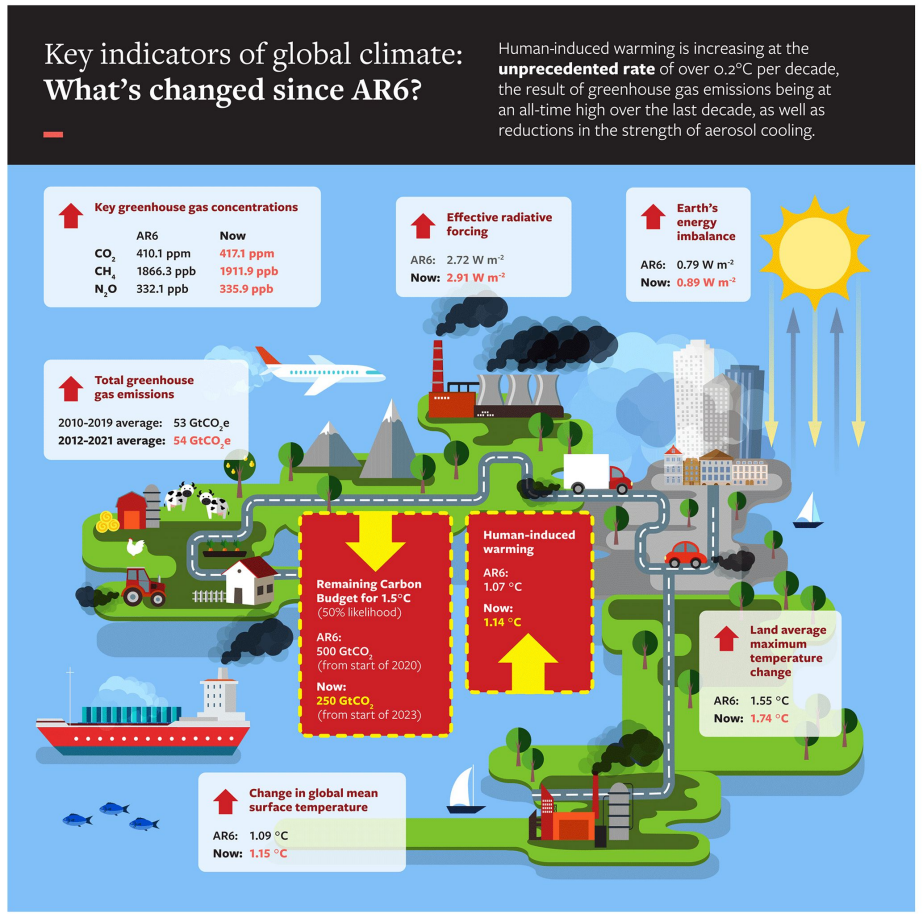
Using Shiny, created an app.R that calls the API to output predicted CO2 values based on user-selected date. Includes png of the generated plot and table of predicted values.
Hosted on shinyapps.io





https://mrahalucla.shinyapps.io/co2-prediction-app/

FUTURE WORK: IT COULD USE SOME 🥲



Graphic from Copernicus.org
https://essd.copernicus.org/articles/15/2295/2023/

- Include other indicators and perform some more complex data analysis.

- Improve efficiency of the model.

- More interesting graphical representations (i.e. localized heatmaps if and where data exists)

- Look into maybe fetching NASA data for more raw data to utilize (gotta butter 'em up somehow)

If you're reading this, congratulations on making it through! We should get cookies 🍪