

STATS 418 FINAL:

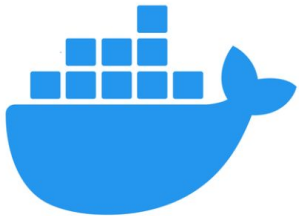
CO₂ CONCENTRATION W/PREDICTIONS

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6/3/2025

(reusing the same theme - ✨consistency✨)

THE MEAT: MODEL API DEVELOPMENT AND DEPLOYMENT

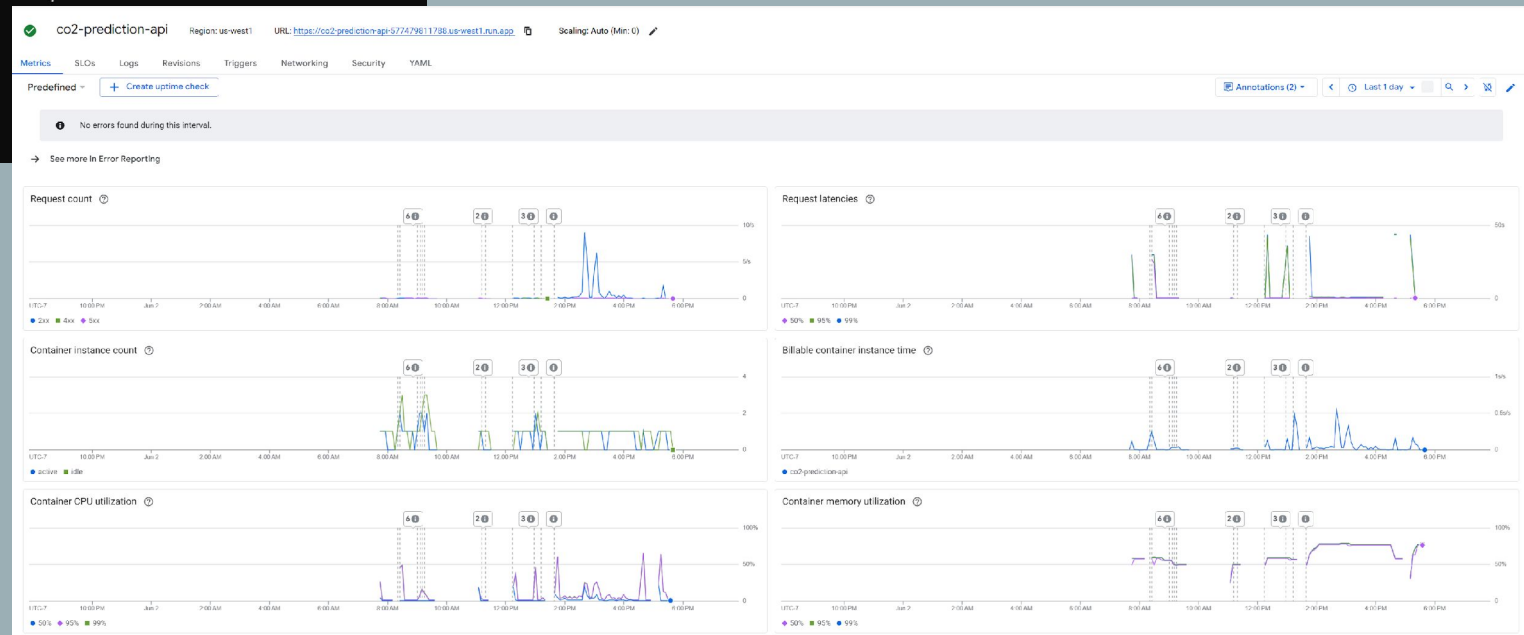


- Fetched JSON data from RapidAPI
- Created model.R
 - Used `auto.arima()` function from the `forecast` package to find best predictive model per the data.
 - With this function, plotted 10 years of data, combining historical and predicted values.
- Created api.R
 - Created reachable endpoints for each 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": "iVBORw0KGgoAAAANSUhEUgAAC7gAAAcICAYAAACsf4x4AAAAACXBIXWMAAC4jAAAUlwF4pT92AAAIAELEQVR4nOzdd7gkVZn48e8Mwww5CRIVkKSSBVYQUBERBQQDKyq6YMBddc2uu+uqoKvIrqKuiF0t5oBZQQERA4gCS5KkkgRBouQ4wDDM3N8f59...
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
```

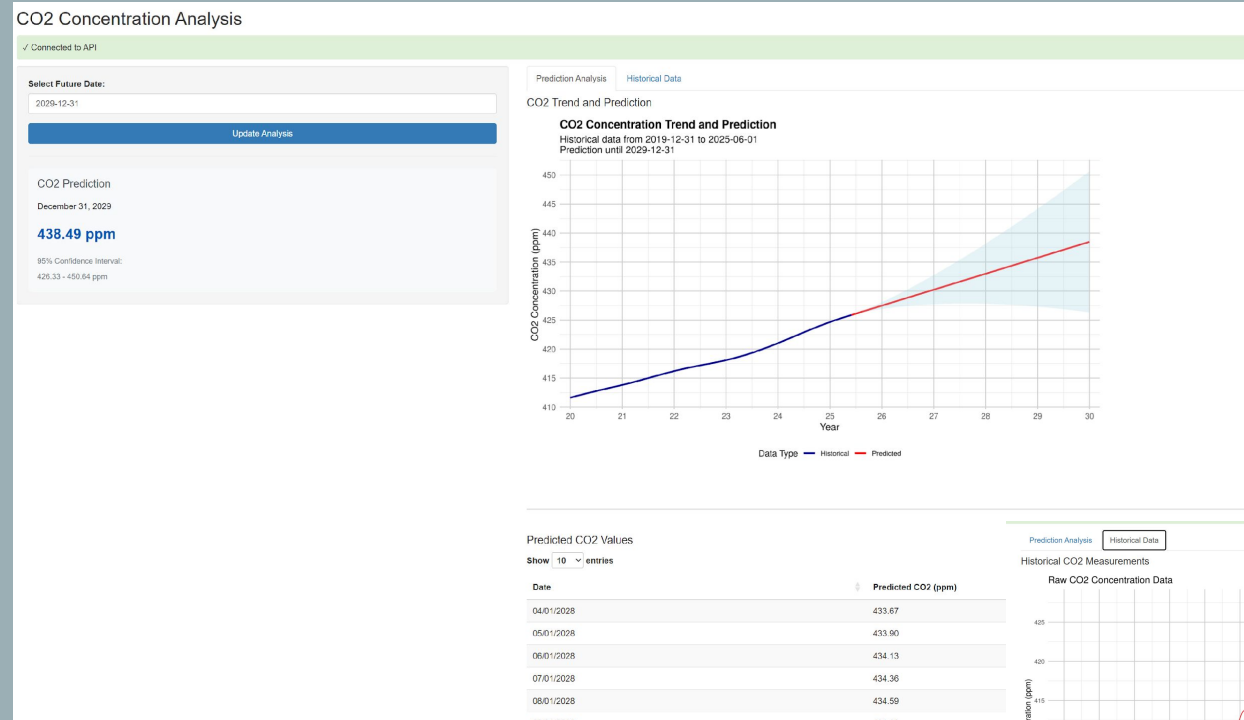


THE PLATING: SHINY R APP ON SHINYAPPS.IO

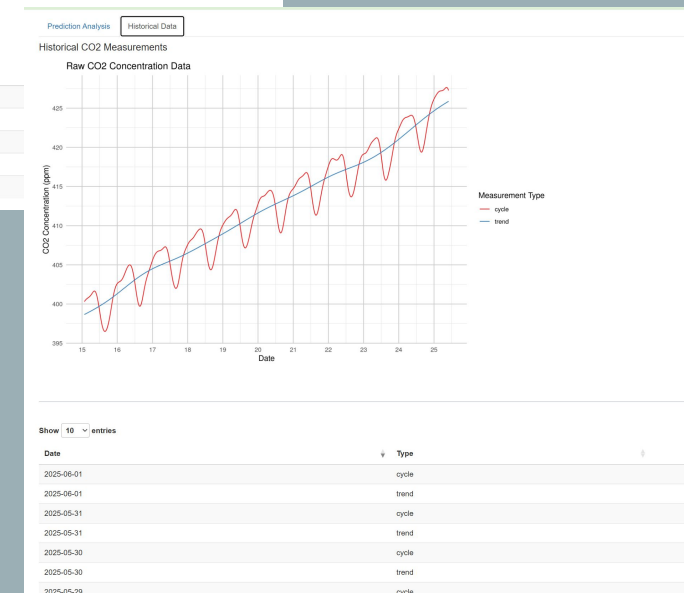


Using Shiny, created an app.R that calls the API to output predicted CO2 values based on user-selected date. Includes png of the generated plot and table of predicted values.

Hosted on shinyapps.io



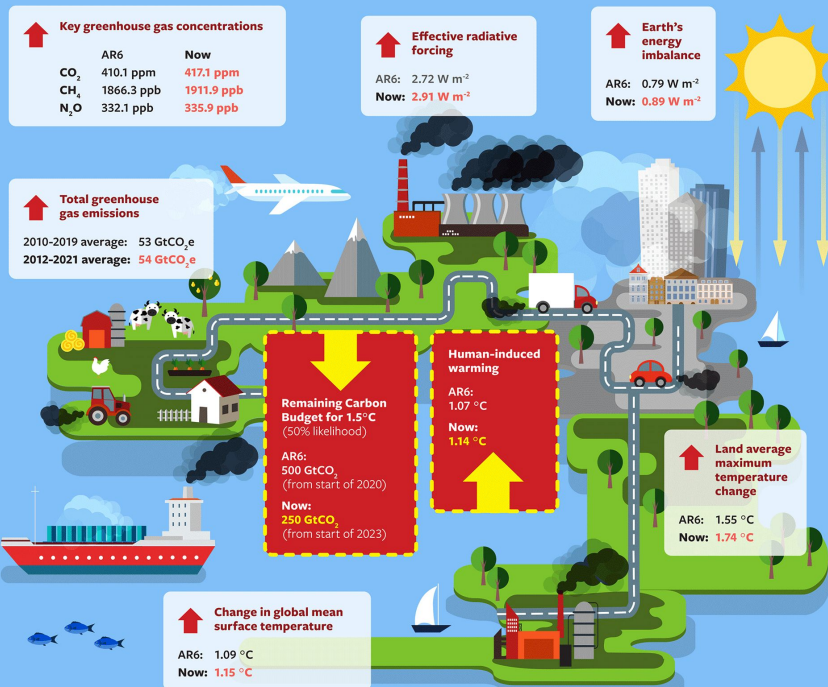
<https://mrahalucla.shinyapps.io/co2-prediction-app/>



FUTURE WORK: IT COULD USE SOME 🥲

Key indicators of global climate: What's changed since AR6?

Human-induced warming is increasing at the **unprecedented rate** of over 0.2°C per decade, the result of greenhouse gas emissions being at an all-time high over the last decade, as well as reductions in the strength of aerosol cooling.



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 🍪