CART 263

Creative Computation 2

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What we’ll be doing today

- Using JSON and APIs
- Work time!

Some Examples

- https://earthquake.usgs.gov/earthquakes/feed/v1.0/' Earthquake API
- https://open-meteo.com/ Weather API
- https://api.nasa.gov/ NASA AP
- https://apipheny.io/free-api/ Huge list of free APIs
  For example: Cat Fact https://catfact.ninja/fact

Get and Post

- GET is used to get information from an API
- POST is used to POST information to an API, we’ll only be talking about getting today.

JSON & APIs

- JSON is a labeled list, it can have complex subsets of data for each point.
- Many APIs will create JSON files for you based on a query (a question)
- These are sometimes requested using an HTTP Request or a query string in a URL

Example: Open-Meteo

- https://open-meteo.com/en/docs#latitude=45.51&longitude=-73.59&hourly=temperature_2m
  Here we are building data set

- https://api.open-meteo.com/v1/forecast?**latitude**=52.52&**longitude**=13.41&**current_weather**=true&**hourly**=temperature_2m,relativehumidity_2m,windspeed_10m Here we created a URL that outputs that data as JSON Here, we create a query string out of our parameters that outputs the data we want. Click here to see.

Lead weather data into P5.JS

We are storing the JSON object inside a variable called weather. We pass the query URL through loadJSON.

```
let weather;
function preload() {
  weather = loadJSON('https://api.open-meteo.com/v1/forecast?latitude=52.52&longitude=13.41&current_weather=true&hourly=temperature_2m,relativehumidity_2m,windspeed_10m');
}
```

Weather data example

```
{
 "latitude": 52.52,
 "longitude": 13.419,
 "elevation": 44.812,
 "generationtime_ms": 2.2119,
 "utc_offset_seconds": 0,
 "timezone": "Europe/Berlin",
 "timezone_abbreviation": "CEST",
 "hourly": {
  "time": ["2022-07-01T00:00", "2022-07-01T01:00", "2022-07-01T02:00", ...],
  "temperature_2m": [13, 12.7, 12.7, 12.5, 12.5, 12.8, 13, 12.9, 13.3, ...]
 },
 "hourly_units": {
  "temperature_2m": "°C"
 },
 "current_weather": {
  "time": "2022-07-01T09:00",
  "temperature": 13.3,
  "weathercode": 3,
  "windspeed": 10.3,
  "winddirection": 262
 }
}
```

https://open-meteo.com/en/docs#latitude=45.51&longitude=-73.59&hourly=temperature_2m

weather.latitude

weather.hourly.temperature[0]

This element contains an array

weather.current_weather.temperature

Weather data example

```
  print("The Weather:")
  print("Located at: "+ weather.latitude+", "+weather.longitude);
  print("Current temp: "+ weather.current_weather.temperature);
  print("Current wind speed: "+ weather.current_weather.windspeed);
  print("The hourly temperature is (in C): ")
  for(let i = 0; i < 5; i++){
    print(weather.hourly.temperature_2m[i]+" C");
  }
```

API Keys

Some APIs have “keys” which are codes that identify unique users. These usually are generated per account and come with limits on requests.

```
  let apikey = "174bed7b788d4c8aaa3b0b9bb04be84d";
  // lets you search by defining "q", and applies your API key into the
URL
  let url = "https://api.nytimes.com/svc/search/v2/articlesearch.json?q="
+ q + "&api-key=" + apikey;
```

Weather data example

```
let weather;
function preload() {
  weather = loadJSON('https://api.open-meteo.com/v1/forecast?latitude=52.52&longitude=13.41&current_weather=true&hourly=temperature_2m,relativehumidity_2m,windspeed_10m');
}

function setup() {
  createCanvas(500, 500);
  background(40);
  print("The Weather:")
  print("Located at: "+ weather.latitude+", "+weather.longitude);
  print("Current temp: "+ weather.current_weather.temperature);
  print("Current wind speed: "+ weather.current_weather.windspeed);
  print("The hourly temperature is (in C): ")
  for(let i = 0; i < 5; i++){
    print(weather.hourly.temperature_2m[i]+" C");
  }
}
```

Challenges (in groups)

- Using the weather API:
- Choose any city and generate a JSON query
- Write the current wind speed and direction in the middle of the screen
- Make the background colour of the canvas reflect the current cloud cover
- Draw that city as a circle on your canvas based on the latitude and longitude
- Draw 5 circles that represent the weather for the last 5 hours using size and color
- Write the remaining time until sunset, and time since sunrise, today in that city.

# Project 2 – Data Visualization
## 20%, individual work

### Overview
Create a piece of code that visualizes any data set in a meaningful way. This can be a piece of live data or information taken from an API, or it can be a data set you have downloaded. Be creative, try and get away from basic charts or maps and represent your data in an interesting, informative, and unique way. Pick a data set that is meaningful to you, and share that information with your audience

I suggest using a CSV file to get data like we looked at in class, although if you are so inclined you can choose another format or source.

Be sure to use Object Oriented concepts to make your code, it will allow you to make more complex work

### Grading And Submissions
Submit your work on Github AND on Moodle. Be sure to include a README that has a link to your data set, an image of your final result, your sketches and ideas, and any libraries or other information needed to run your code.
50% Concept, creativity and execution
25% Code quality, readme file and comments
25% Complexity and exploration