

CART 263 **Creative Computation 2**

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Office Hours: Tuesday 12-1

Course Github: <https://github.com/LeeCyborg/CART263-W-23>

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What we'll be doing today

- Data Vis Examples
- Learning about tables and data
- Discuss project 2 & pick your data set

Data Vis Inspo

- Nathalie Miebach <https://www.instagram.com/miebachsculpture/>
- Aaron Koblin <http://www.aaronkoblin.com/>
- Jer Thorp <https://www.jerthorp.com/portfolio>
- Laurie Frick <https://www.lauriefrick.com/works>
- [Dietmar Offenhuber](https://offenhuber.net/) <https://offenhuber.net/>
- <https://openprocessing.org/browse/?time=anytime&type=all&q=data%20visualization%20#>

Sets of data

These are just a few examples, there are tons of data sets out there! For this demo, we're only using CSV files, but for the project feel free to explore any data viz you want.

Kaggle <https://www.kaggle.com/datasets?tags=13208-Data+Visualization>

Free Public Data Sets For Analysis <https://www.tableau.com/learn/articles/free-public-data-sets>

Stats Canada <https://www.statcan.gc.ca/en/start>

CMU Motion Data <https://github.com/sxaxmz/CMU-Dataset-Partially-Labelled>

US Data.gov https://catalog.data.gov/dataset/?res_format=CSV

CSV files

Comma Separated Values

These files are easy to parse by code, and to make into a table or visualization.

For this class, start with a small data set. Take a small piece of a larger data set, or find or make a small piece of data to test and grow from there.

CSV files often have “headers” which refers to the first line of the file, this doesn’t contain data but the “name” of the column. Idexes start at 0 like arrays

Header	Header	Header
Row 0 col 0	Row 0 col 1	Row 0 col 2
Row 1 cal 0	Row 1 col 1	Row 1 col 2
Row 2 col 0	Row 2 col 1	Row 2 col 2

Always open your data in a spreadsheet program to see it while you work

EVA #	Country	Crew	Vehicle	Date	Duration	Purpose
1	USA	Ed White	Gemini IV	06/03/1965	0:36	First U.S. EVA. Used HHMU and took photos. Gas flow
2	USA	David Scott	Gemini VIII		0:00	HHMU EVA cancelled before starting by stuck on vehicle
3	USA	Eugene Cernan	Gemini IX-A	06/05/1966	2:07	Inadequate restraints, stiff 25ft umbilical and high work
4	USA	Mike Collins	Gemini X	07/19/1966	0:50	Standup EVA. UV photos of stars. Ended by eye irrita
5	USA	Mike Collins	Gemini X	07/20/1966	0:39	Retrieved MMOD experiment from docked Agena. Use
6	USA	Richard Gordon	Gemini XI	09/13/1966	0:44	Attached tether between Agena and Gemini. EVA end
7	USA	Richard Gordon	Gemini XI	09/14/1966	2:10	Standup EVA. Took star photos. Agena tether ops
8	USA	Buzz Aldrin	Gemini XII	11/12/1966	2:29	Standup EVA. Science tasks. Took star photos
9	USA	Buzz Aldrin	Gemini XII	11/13/1966	2:06	Attached tether between Agena and Gemini. UV photo
10	USA	Buzz Aldrin	Gemini XII	11/14/1966	0:55	Standup EVA. Jettisoned equipment. Took photos
11	USA	David Scott	Apollo 9	03/06/1969	0:47	Standup EVA from crew module. Retrieved thermal ex
12	USA	Russ Schweickart	Apollo 9	03/06/1969	0:51	Lunar module based. Took photos. Evaluated foot res
13	USA	Neil Armstrong Buzz Aldrin	Apollo 11	07/20/1969	2:32	First to walk on the moon. Some trouble getting out s
14	USA	Neil Armstrong Buzz Aldrin	Apollo 11	07/20/1969	0:05	Jettison suit backpacks and equip to lighten ascent

P5JS Tables

<https://p5js.org/reference/#/p5.Table>

P5 has a set of methods for dealing with tables, lets check them out!

Load and loop

File path

Header to indicate the columns are labeled

```
let table;
function preload() {
  table = loadTable("EVA_Data.csv", "csv", "header");
}
```

```
function setup() {
  createCanvas(500, 500);
  console.log(table.getRowCount() + " total rows in table");
  console.log(table.getColumnCount() + " total columns in table");
  console.log(table.getColumn("Crew"));
  // use a nested for loop to cycle through the table's cells
  for (var r = 0; r < table.getRowCount(); r++){
    for (var c = 0; c < table.getColumnCount(); c++) {
      console.log(table.getString(r, c));
    }
  }
}
```


Load and loop

```
for (var r = 0; r < table.getRowCount(); r++){  
    for (var c = 0; c < table.getColumnCount(); c++) {  
        console.log(table.getString(r, c));  
    }  
}
```

Lets take a closer look at this loop. It goes through each row (r) and for each row, it goes through each column (c). Similar to how we made grids!

```
console.log(table.getString(row, col));
```

```
console.log(table.getString(3, 2));
```

EVA #	Country	Crew	Vehicle	Date	Duration	Purpose
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Find specific data

```
let rows = table.findRows('USA', 'Country');
print(rows.length + ' USA Walks found');
for (let i = 0; i < rows.length; i++){
    print(rows[i]);
}
```

p5.mi

```
▼ o.default.TableRow {arr: Array(7), obj: {...}, table: o.d...t.Table}
  ▼ arr: Array(7)
    0: "227"
    1: "USA"
    2: "Sunita Williams      Akihiko Hoshide "
    3: "ISS-Incr 32"
    4: "08/30/2012"
    5: "8:17"
    6: "ISS based EVA.  Installed 1 of 2 power cables for future M
      length: 7
    ► [[Prototype]]: Array(0)
  ► obj: {EVA #: '227', Country: 'USA', Crew: 'Sunita Williams
  ► table: o.default.Table {columns: Array(7), rows: Array(375)}
  ► [[Prototype]]: Object
```

<https://p5js.org/reference/#/p5.Table/findRow>

```
print(rows[i].arr[2]); // Get Names, by printing argument 2
```

Put it into an object

```
for (var r = 0; r < table.getRowCount(); r++){ // Cycle through each row of the table
    points[r] = new DataPoint(table.getString(r, 1),
                              table.getString(r, 2),
                              table.getString(r, 5),
                              table.getString(r, 0));
    // Pass through the values in each row
}
[... 1 2 5 0
constructor(country, name, duration, ID){
    // Add each data point to the object
    this.country = country;
    this.duration = duration;
    this.name = name;
    this.ID = ID;
    this.x;
    this.y;
}
```

	0	1	2		5	
EVA #	Country	Crew		Vehicle	Date	Duration Purpose
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Template Example *don't forget the CSV

Find full example and data set on Github

```
let table;
let points = [];

function preload() {
  table = loadTable("EVA_Data.csv", "csv", "header");
}

function setup() {
  createCanvas(800, 800);
  background(0);
  for (var r = 0; r < table.getRowCount(); r++){ // Cycle through each row of the table
    points[r] = new DataPoint(table.getString(r, 1),
                              table.getString(r, 2),
                              table.getString(r, 5),
                              table.getString(r, 0));
    // Pass through the values in each row
  }
}

class DataPoint {
  constructor(country, name, duration, ID){
    // Add each data point to the object
    this.country = country;
    this.duration = duration;
    this.name = name;
    this.ID = ID;
    this.x;
    this.y;
  }

  drawBasic(){
    this.x = random(width);
    this.y = random(height);
    noStroke();
    ellipse(random(width), random(height), int(this.duration)*3);
  }

  drawCircle(){
    this.radius = 150;
    this.t=0;
    this.angle = map(this.ID, 0, table.getRowCount(), 0, 1)*Math.PI*2;
    this.x = Math.cos(this.angle)*this.radius+width/2;
    this.y = Math.sin(this.angle)*this.radius+height/2;
    noStroke();
    fill(0, 200, 20, 40);
    ellipse(this.x, this.y, int(this.duration)*3);
    fill(0, 100, 200);
    textSize(5);
    push();
    if(this.angle > Math.PI/2 && this.angle < Math.PI*1.5){
      this.t = textWidth(this.name);
      fill(255, 0,0);
      translate(this.x, this.y);
      rotate(this.angle+Math.PI);
    } else {
      translate(this.x, this.y);
      rotate(this.angle);
    }
    text(this.name, 0-this.t, 0);
    pop();
  }
}
```

Challenges (in groups)

Use the EVA Data Set:

1. Draw different colours circles for USA and Russian EVAs
2. Display crew names on each circle
3. Arrange all flights in a timeline (first to last)
4. Load a new data set (your choice)
5. Create a small visualization using circles to describe your new data set

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