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第三回 亂世の始まりと、その始まりの原因

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THE JOURNAL OF CLIMATE

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第三回 花村の火事と火事の花村

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第2章 云原生基础与实践

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中華書局影印
古今圖書集成

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Data

data

'facts and statistics collected together for reference or analysis'.

The aim of this presentation is to look at data and explore how it can be used and visualized.

It will provide you with a foundation of the practical ways in which data can be incorporated into your projects.

What we will cover

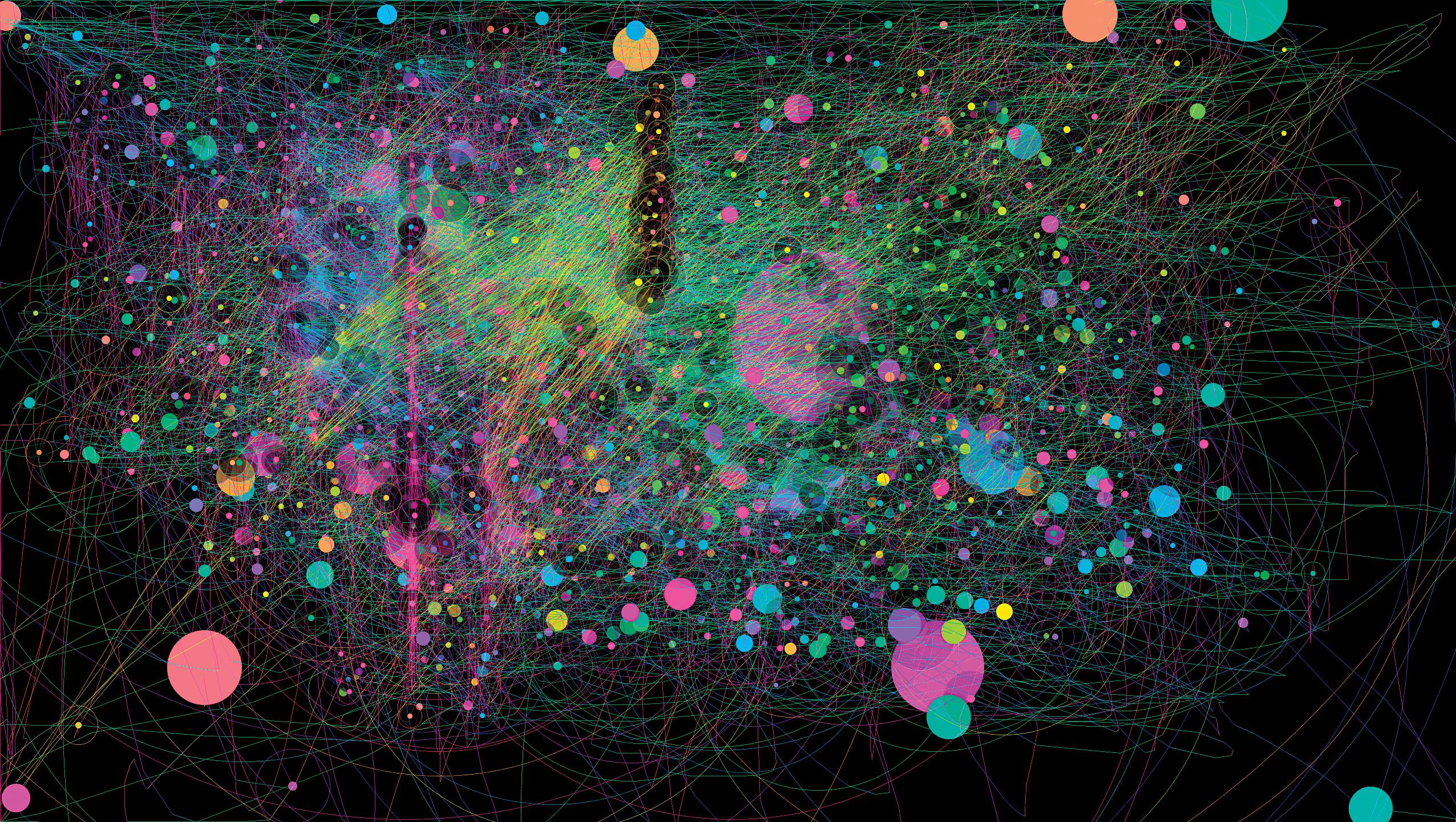
- 1) Context – Why is data increasingly important to artists and designers
- 2) Small Data!
- 3) Tables – csv file
- 4) Internet data formats - JSON and XML
- 5) Internet Of Things
- 6) Open Data and using API's

Download to your processing folder

- <https://github.com/JohnMechatronics/Data>

Aaron Koblin

- [Aaron Koblin](#) is an artist specializing in data and digital technologies.
- Koblin is best known for his innovative use of data visualization and his pioneering work in crowdsourcing and interactive film.
- He is famous for his project ‘Flight Patterns’ which visualizes every airline flight over North America in a 24-hour period.
- <https://www.youtube.com/watch?v=ystkKXzt9Wk>



Small Data !!!

Small Data !!!

- Small data in everyday life ?
- Shopping lists
- To Do lists
- People in the room

Can you think of other example of Small Everyday Data?

- Use Text edit to create a list of names of people in the room.
- Save it as names.txt

Using data within Programming Languages

- Variables – used to name and store pieces of data within the program
- primitives – variables that store a single data type
 - int – stores a whole number
 - float – stores a fraction eg 1.5
 - char – stores a single character

Arrays

- Arrays are created to store a list of elements within a single Variable name.
- If variables can be thought of as buckets that hold a single piece of information, then arrays can be thought of as a collection of buckets, or a big bucket with a lot of little buckets inside.

```
int ledPins[] = {2,3,4,5,6,7,8,9};
```

```
ledPins[0] =2;
```

```
ledPins[1] =3;
```

```
ledPins[2] =3;
```

Arrays

- Arrays are extremely useful for a lot of different programs
- For example, if I want to blink eight LED's at the same time, I could put them in an array, and then use a for loop to iterate over the array, like so:

```
int ledPins[] = {2,3,4,5,6,7,8,9};
```

```
for( int i = 0; i < 8; i++ ) {  
    pinMode(ledPins[i], OUTPUT);  
}
```

Read a simple text file

Reat_Simple_TextFile ▾

```
// This code will print all the lines from the source text file.  
String[] lines = loadStrings("file.txt");  
  
println("There are " + lines.length + " students in the class.");  
println("-----");  
printArray(lines);
```

Save a list of students (file.txt)
to the sketches data folder

CSV – Comma Separated Variable

- a comma-separated values (CSV) file stores numbers and text in plain text.
- Each line of the file is a data record.
- Each record consists of one or more fields, separated by commas.

eg. 22,54,61,90,9,23,45,

Task – Reading a simple SCV

- Open a new text file -TextEdit.
- Each student should contribute a number between 0 - 200
- Save the file as data.csv
- into the data folder of Read_CSV_File

Bigger Data !

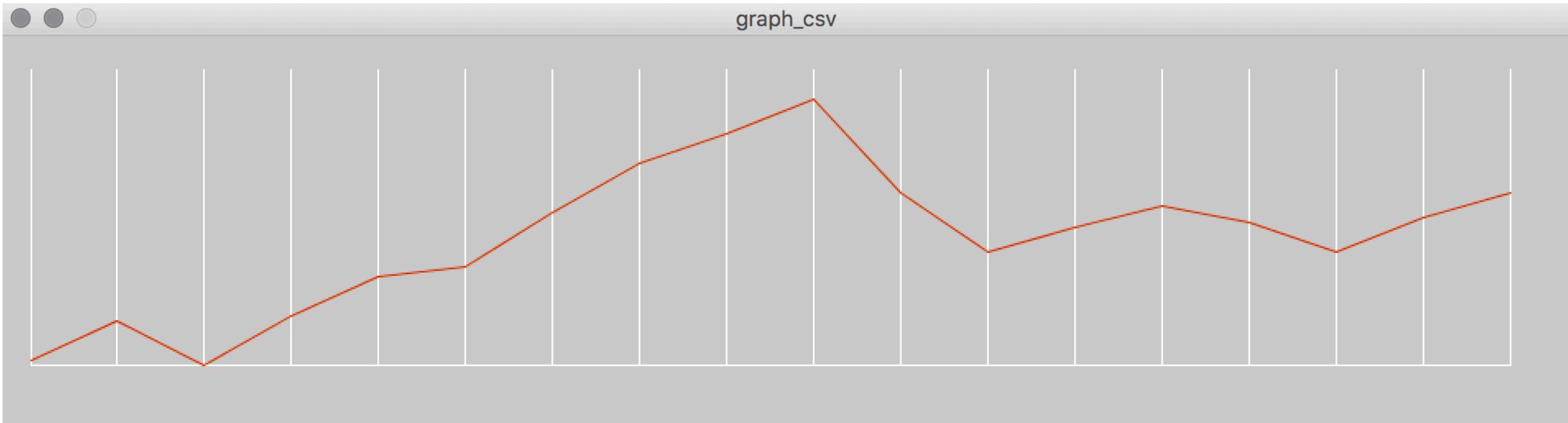
Tabular Data / Tables / Spread sheets

- A table consists of data arranged as a set of rows and columns, also called “tabular data.”

160	103	43.19838	Happy
372	137	52.42526	Sad
273	235	61.14072	Joyous
121	179	44.758068	Melancholy

Task - graph_csv

- Open folder graph_CSV
- Open /data/ortiz.csv into numbers or excell
- Run the program graph_CSV



Uses a built in Table objects

Task

- Right click on Table
- Select ‘Find in Reference”

Tables with Headers

x	y	diameter	name
160	103	43.19838	Happy
372	137	52.42526	Sad
273	235	61.14072	Joyous
121	179	44.758068	Melancholy

Table Object deals with the header
Enabling us to use it in our code

Large tabula data file with a header

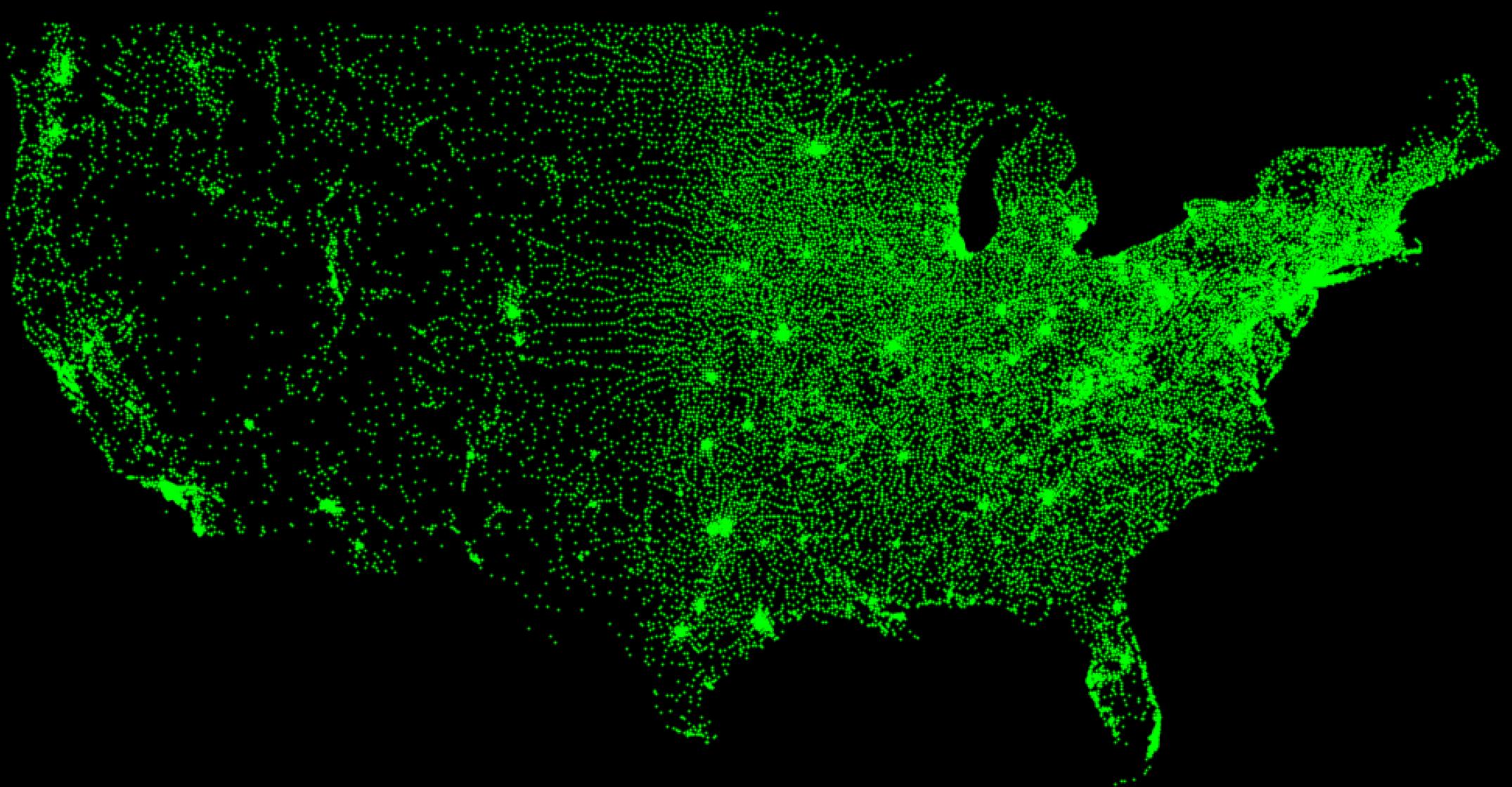
- Open - animate_cities_csv/data/cities.csv
- Look at the data
- Run animate_cities_csv

animate_cities_csv

```
1 //Reads a csv file of US cities and maps the city location to points on screen.  
2  
3 Table cities; //  
4 int i = 0;  
5 void setup() {  
6     background(0, 0, 0);  
7     frameRate(30);  
8     size(1000, 600);  
9     cities = loadTable("cities.csv", "header");  
10    stroke(0,255,0);  
11}  
12  
13 void draw() {  
14  
15     translate(-900, -750);  
16     scale(6);  
17     strokeWeight(0.3);  
18  
19     if (i < cities.getRowCount()){  
20         float latitude = cities.getFloat(i, "lat");  
21         float longitude = cities.getFloat(i, "lng");  
22         setXY(latitude, longitude);  
23         i++;  
24     }  
25 }  
26  
27 void setXY(float lat, float lng) {  
28     float x = map(lng, -180, 180, 0, width);  
29     float y = map(lat, 90, -90, 0, height);  
30     point(x, y);  
31 }  
32  
33
```



USA_MAP_csv



Big Data

Big Data

- Extremely large data sets that may be analysed computationally to reveal patterns, trends, and associations, especially relating to human behaviour and interactions.

Open Data

- **Open data** is the idea that some data should be freely available to everyone to use and republish as they wish, without restrictions from copyright, patents or other mechanisms of control.
- Government - <https://data.gov.uk/>
- TFL - <https://tfl.gov.uk/info-for/open-data-users/our-open-data>
- openStreet Map - <https://www.openstreetmap.org/#map=5/54.910/-3.432>
- Twitter API

Accessing open data from your Program

- Unfortunately Data is not standard
- Key File types –
 - CSV
 - XML
 - JSON
 - API
 - HTML

XML and JSON(Extensible Markup Language)

- XML (Extensible Markup Language)
- JSON (JavaScript Object Notation)
- Standardised methods of storing data for distribution of data across the internet
- Luckily Processing, and most common programming languages have built in classes to for reading them.

```
{  
    "title": "Breathless",  
    "director": "Jean-Luc Godard",  
    "year": 1960,  
    "rating": 8.0  
},  
{  
    "title": "Le Petit Soldat",  
    "director": "Jean-Luc Godard",  
    "year": 1960,  
    "rating": 7.2  
},  
{  
    "title": "A Woman Is a Woman",  
    "director": "Jean-Luc Godard",  
    "year": 1961,  
    "rating": 7.7  
},  
{  
    "title": "My Life to Live",  
    "director": "Jean-Luc Godard",  
    "year": 1962,  
    "rating": 8.1  
},  
{  
    "title": "Les Carabiniers",  
    "director": "Jean-Luc Godard",  
    "year": 1963,  
    "rating": 7.0  
},  
{  
    "title": "Contempt",  
    "director": "Jean-Luc Godard",  
    "year": 1963,  
    "rating": 7.8  
},
```

```
JSONObject film;  
  
void setup() {  
    film = loadJSONObject("film.json");  
    String title = film.getString("title");  
    String dir = film.getString("director");  
    int year = film.getInt("year");  
    float rating = film.getFloat("rating");  
    println(title + " by " + dir + ", " + year);  
    println("Rating: " + rating);  
}
```

JSON at the heart of IOT!

IOT - Internet of things.

Thing <-----> JSON <-----> Thing

API (Application Programming Interface)

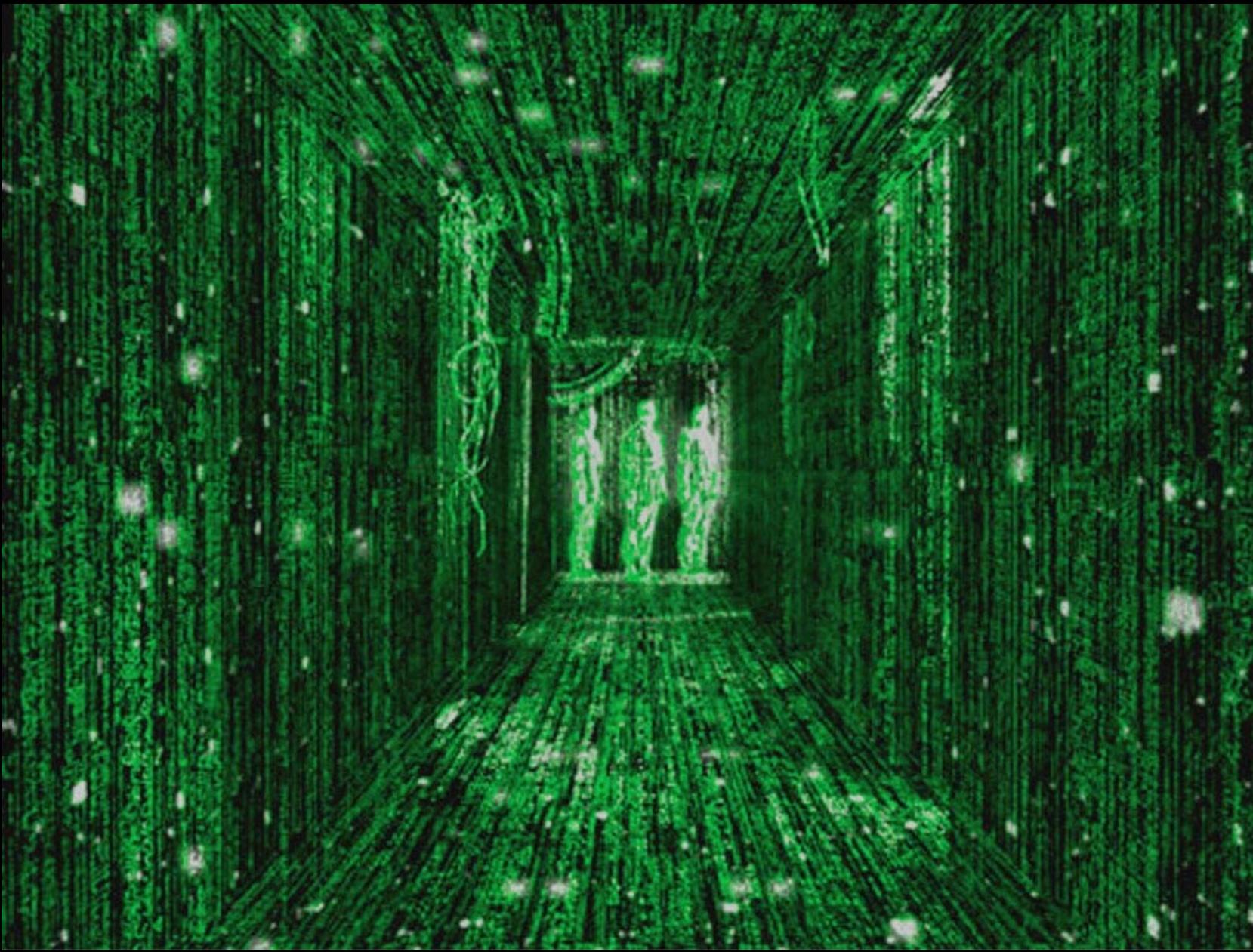
- An API is an interface through which one application can access the services of another.
- These can come in many forms.
- The key element that makes this service an API is exactly that its sole purpose in life is to offer you its data.
- Not just offer it, but allow you to query it for specific data in a specific format.

Examples

- Twitter
- Openweathermap.org

Scraping data

- If you need data that is online but not in any of these formats
- You can scrape it from the HTML.



More reading

- <https://processing.org/tutorials/data/>