Arrays

Creative Coding & Generative Art in Processing 2

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Variables

- int x = 0;
- float delta = 0.483;
- color darkOliveGreen = color(85, 107, 47);
- String colorName = "Dark Olive Green";
- PImage castle = loadImage("myCastle.jpg");

A Set of Sample Values

Petroleum	Coal	Natural Gas	Nuclear	Renewable	Hydropower
40.0	23.0	22.0	8.0	4.0	3.0

```
float petroleum = 40.0;
float coal = 23.0;
float naturalGas = 22.0;
float nuclear = 8.0;
float renewable = 4.0;
float hydropower = 3.0;
```

Declaration

```
float[] consumption;
consumption = new float[6];
```

Creation

index →	0	1	2	3	4	5
consumption	44.0	23.0	22.0	8.0	4.0	3.0

A Set of Sample Values

```
//Define, create and initialize the data in an array
float[] consumption = {40.0, 23.0, 22.0, 8.0, 4.0, 3.0};
```

A Set of Sample Values

```
//Declare and create an array with size 6
float[] consumption = new float[6];
//store values
consumption[0] = 40.0;
consumption[1] = 23.0;
consumption[2] = 22.0;
consumption[3] = 8.0;
consumption[4] = 4.0;
consumption[5] = 3.0;
```

Arrays

- // An array to hold the names of all the days in a week
  String[] weekDays = {"Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"};
- // two arrays, each containing high and low temperature values
  float[] highTemps, lowTemps;
- int[] count; // an array of integers
- PImage[] photos; // an array of photos
- // An array to hold the names of months in a year
  String[] months = {"January", "February", "March", "April", "May", "June", "July", "August", "September", "October", "November", "December"};
- // The colors in a rainbow
  color[] rainbow = {color(255, 0, 0), color(255, 127, 0), color(255, 255, 0), color (0, 255, 0), color (0, 0, 255), color (111, 0, 255), color (143, 0, 255)};

Indexing, Size and Loops

```
int[] n = new int[1000];
for (int i=0; i < n.length; i++) {
   n[i] = i;
}
```

```
int[] n = new int[1000];
for (int i= n.length-1; i>=0; i--) {
   n[i] = i;
}
```

for-each Loop

- Syntax
  - for (variable : arrayName) { // do something with the value of variable }
- Example

```
String[] energySource = {"Petroleum", "Coal", "Natural Gas", "Nuclear", "Renewable", "Hydropower"};
for(String str :  energySource) {
   println(str);
}
```

Example: A Simple Bar Graph

```
String[] energySource = {"Petroleum", "Coal", "Natural Gas", "Nuclear",
                         "Renewable", "Hydropower"};
float[] consumption = {40.0, 23.0, 22.0, 8.0, 4.0, 3.0};
void setup() {
   size(400, 400); smooth();
} // setup()
void draw() { // set up plot dimensions relative to screen size
   float x = width*0.1;
   float y = height*0.9;
   float delta = width*0.8/consumption.length;
   float w = delta*0.8;
   background(255);
   for (float value : consumption) { // draw the bar for value
      // first compute the height of the bar relative to sketch window
      float h = map(value, 0, 100, 0, height);
      fill(0);
      rect(x, y-h, w, h);
      x = x + delta; }
} // draw()
```

Array Operations

- String[] energySource = {"Petroleum", "Coal", "Natural Gas", "Nuclear", "Renewable", "Hydropower"};
- float[] consumption = {40.0, 23.0, 22.0, 8.0, 4.0, 3.0};

Printing

```
println(consumption.length);
println(consumption);
```

```
6
[0]  40.0
[1]  23.0
[2]  22.0
[3]  8.0
[4]  4.0
[5]  3.0
```

```
println(energySource);
```

```
[0]  Petroleum
[1]  Coal
[2]  Natural Gas
[3]  Nuclear
[4]  Renewable
[5]  Hydropower
```

Try it

Given the following arrays,

- String[] energySource = {"Petroleum", "Coal", "Natural Gas", "Nuclear", "Renewable", "Hydropower"};
- float[] consumption = {40.0, 23.0, 22.0, 8.0, 4.0, 3.0};

write commands to print the values from energySource and consumption in the format shown here:

```
Petroleum, 40.0
Coal, 23.0
Natural Gas, 22.0
Nuclear, 8.0
Renewable, 4.0
Hydropower, 3.0
```

Min, Max and Soring

- float smallest = min(consumption);
- float largest = max(consumption);
- println(sort(consumption));
- println(sort(energySource));

Other Array Operation

- Reverse the ordering of elements in an array
  - reverse()
- Expand the size of the array
  - append(), expand()
- Shorten it
  - shorten()
- Concatenate or split arrays
  - concat(), subset(), splice()
- Copy the contents of an array
  - arrayCopy()

Arrays as Parameters

```
// Bar Graph using a barGraph() function
String[] energySource = {"Petroleum", "Coal", "Natural Gas", "Nuclear", "Renewable",
                         "Hydropower"};
float[] consumption = {40.0, 23.0, 22.0, 8.0, 4.0, 3.0};
void setup() { size(400, 400);  smooth(); } // setup()
void draw() { background(255); barGraph(consumption);  } // draw()

void barGraph(float[] data) { // set up dimensions relative to screen size
    float x = width*0.1;     float y = height*0.9;
    float delta = width*0.8/data.length;
    float w = delta*0.8;
    for (float i : data) { // draw the bar for ith data value
        // first compute the height of the bar relative to sketch window
        float h = map(i, 0, 100, 0, height);
        fill(0); rect(x, y-h, w, h);
        x = x + delta;
    }
} // barGraph()
```