Sprite extraction and animation

PRINCIPLE

Before doing anything interesting with the sprites, we need to:

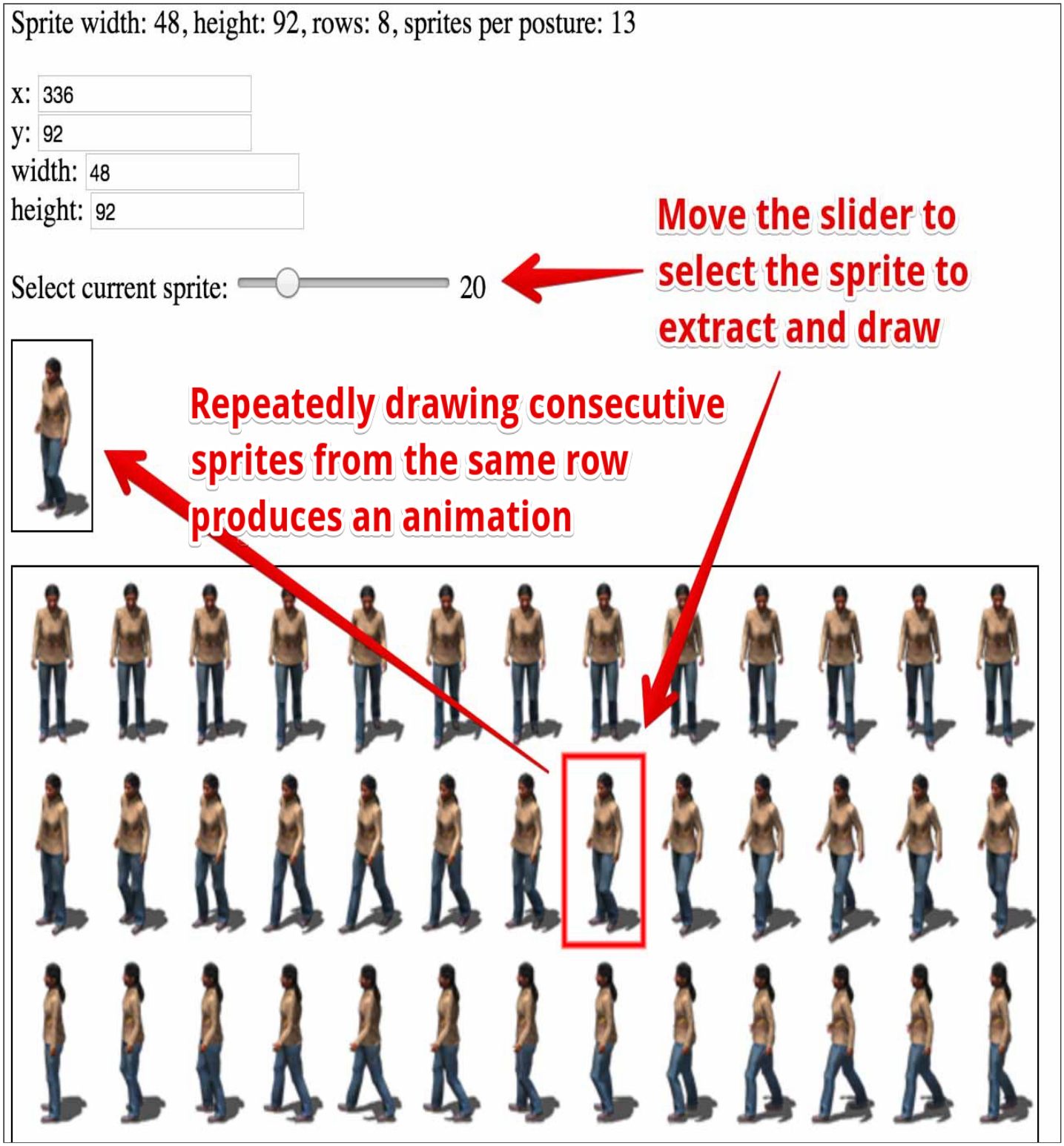
1. Load the different images,
2. Extract the different sprite sets and store them in an array of sprites somewhere,
3. Draw them from the animation loop, taking into account the time. We cannot draw a different image of the woman walking 60 times/s. We will have to specify some sort of "delay" between each change of sprite image.

In this lesson we use an interactive tool to present the principle of sprite extraction and animation.

SPRITE EXTRACTION

Example 1: move the slider to extract the slide indicated by the slider value. See the red rectangle? This is one of the sprite images! When you move the slider, the corresponding sprite is drawn in the small canvas. See how it makes an animation?

Try it at JSBin:



HTML code:

```
<html lang="en">
 <head>
 <title>Extract and draw sprite</title>
 <style>
   canvas {
```

```
      border: 1px solid black;
    }
 </style>
 </head>
 <body>
   Sprite width: 48, height: 92, rows: 8, sprites per posture: 13<p>
   <label for="x">x: <input id="x" type="number" min=0><br/>
   <label for="y">y: <input id="y" type="number" min=0><br/>
   <label for="width">width: <input id="width" type="number" min=0>
<br/>
   <label for="height">height: <input
id="height" type="number" min=0><p>
Select current sprite: <input type=range
id="spriteSelect" value=0> <output id="spriteNumber">
 <p/>
   <canvas id="canvas" width="48" height="92" />
 </p>
   <canvas id="spritesheet"></canvas>
 </body>
</html>
```

Notice that we use an `<input type="range">` to select the current sprite, and we have two canvases: a small one for displaying the current selected sprite, and a big one that contains the sprite sheet and in which we draw a red square to highlight the selected sprite.

Extract of JavaScript code. You don't have to understand all the details, just look at the part in bold where we extract the sub-images:

```
var SPRITE_WIDTH = 48;   // Characteristics of the sprites and
spritesheet
var SPRITE_HEIGHT = 92;
var NB_ROWS = 8;
var NB_FRAMES_PER_POSTURE = 13;

// the different input and output fields
var xField, yField, wField, hField, spriteSelect, spriteNumber;

// The two canvases and respective contexts
var canvas, canvasSpriteSheet, ctx1, ctx2;

window.onload = function() {
    canvas = document.getElementById("canvas");
    ctx1 = canvas.getContext("2d");
    canvasSpriteSheet = document.getElementById("spritesheet");
```

```
    ctx2 = canvasSpriteSheet.getContext("2d");
    xField = document.querySelector("#x");
    yField = document.querySelector("#y");
    wField = document.querySelector("#width");
    hField = document.querySelector("#height");
    spriteSelect = document.querySelector("#spriteSelect");
    spriteNumber = document.querySelector("#spriteNumber");

    // Update values of the input fields in the page
    wField.value = SPRITE_WIDTH;
    hField.value = SPRITE_HEIGHT;
    xField.value = 0;
    yField.value = 0;
    // Set attributes for the slider depending on the number of sprites on the
    // sprite sheet
    spriteSelect.min = 0;
    spriteSelect.max=NB_ROWS*NB_FRAMES_PER_POSTURE - 1;
    // By default the slider is disabled until the sprite sheet is fully loaded
    spriteSelect.disabled = true;
    spriteNumber.innerHTML=0;
    // Load the spritesheet
    spritesheet = new Image();
    spritesheet.src="http://i.imgur.com/3VesWqx.png";
    // Called when the spritesheet has been loaded
    spritesheet.onload = function() {
      // enable slider
      spriteSelect.disabled = false;
      // Resize big canvas to the size of the sprite sheet image
      canvasSpriteSheet.width = spritesheet.width;
      canvasSpriteSheet.height = spritesheet.height;
     // Draw the whole spritesheet
     ctx2.drawImage(spritesheet, 0, 0);

     // Draw the first sprite in the big canvas, corresponding to sprite 0
     // wireframe rectangle in the sprite sheet

 drawWireFrameRect(ctx2, 0 , 0, SPRITE_WIDTH, SPRITE_HEIGHT, 'red', 3);

     // small canvas, draw sub image corresponding to sprite 0
     ctx1.drawImage(spritesheet, 0, 0, SPRITE_WIDTH, SPRITE_HEIGHT,
                                 0, 0, SPRITE_WIDTH, SPRITE_HEIGHT);
   };
```

```
    // input listener on the slider
61.   spriteSelect.oninput = function(evt) {
      // Current sprite number from 0 to NB_FRAMES_PER_POSTURE *
NB_ROWS
      var index = spriteSelect.value;
      // Computation of the x and y position that corresponds to the
sprite
      // number index as selected by the slider
      var x = index * SPRITE_WIDTH % spritesheet.width;

     var y = Math.floor(index / NB_FRAMES_PER_POSTURE) * SPRITE_HEIGHT;
      // Update fields
71.   xField.value = x;
      yField.value = y;
      // Clear big canvas, draw wireframe rect at x, y, redraw
stylesheet

     ctx2.clearRect(0, 0, canvasSpriteSheet.width, canvasSpriteSheet.height);
      ctx2.drawImage(spritesheet, 0, 0);

     drawWireFrameRect(ctx2, x , y, SPRITE_WIDTH, SPRITE_HEIGHT, 'red', 3);

      // Draw the current sprite in the small canvas
      ctx1.clearRect(0, 0, SPRITE_WIDTH, SPRITE_HEIGHT);
81.   ctx1.drawImage(spritesheet, x, y, SPRITE_WIDTH, SPRITE_HEIGHT,
                                  0, 0, SPRITE_WIDTH, SPRITE_HEIGHT);

      // Update output elem on the right of the slider
      spriteNumber.innerHTML = index;
    };
  };

  function drawWireFrameRect(ctx, x, y, w, h, color, lineWidth) {
    ctx.save();
91.   ctx.strokeStyle = 'red';
    ctx.lineWidth = lineWidth;
    ctx.strokeRect(x , y, w, h);
    ctx.restore();
  }
```

Explanations:

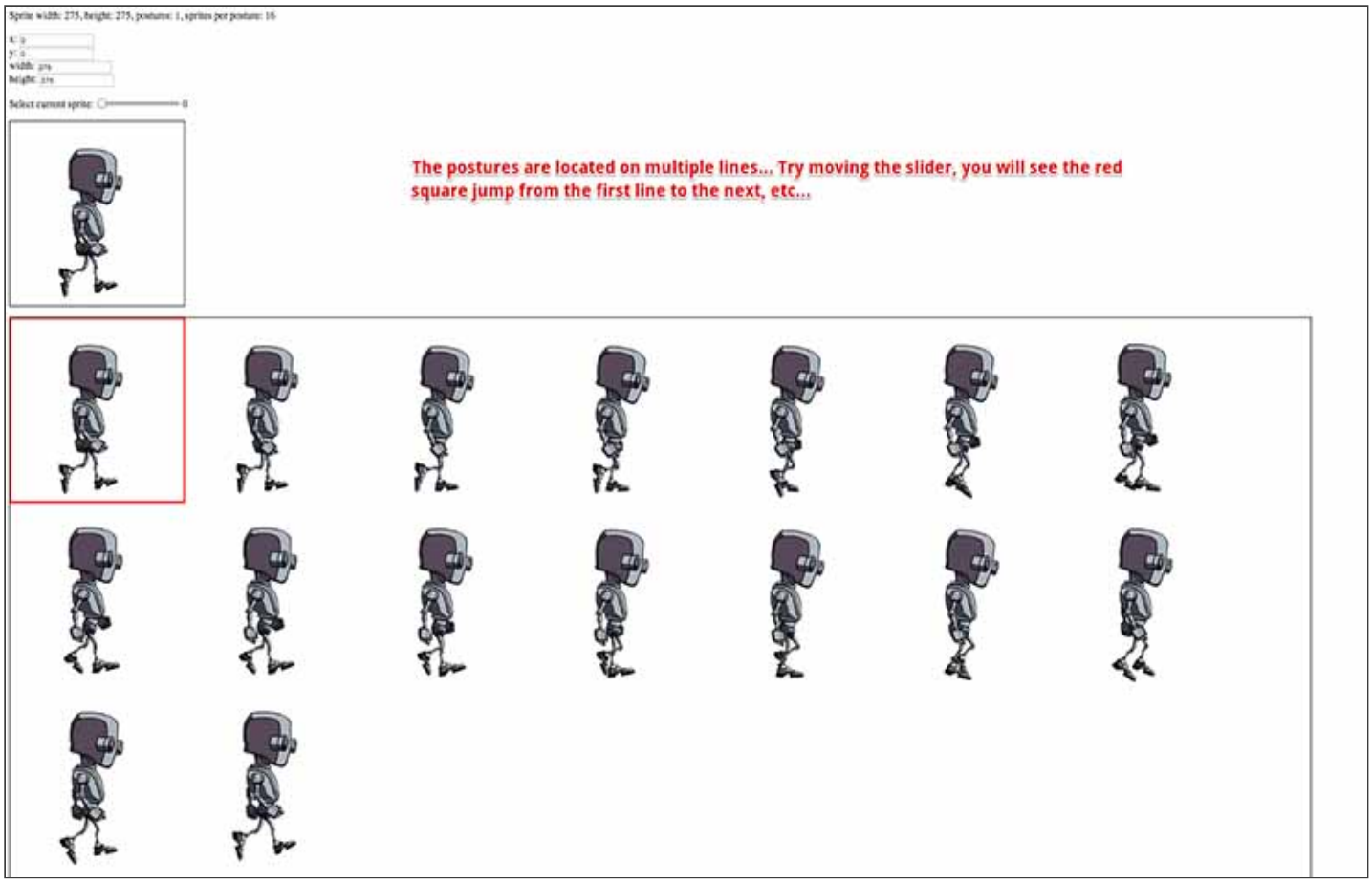
- *Lines 1-4*: characteristics of the sprite sheet. How many rows, i.e., how many sprites per row, etc.
- *Lines 11-39*: initializations that run just after the page has been loaded. We first get the canvas and

contexts, then we set the min and max values of the slider (an `<input type=range>`) at *lines 31-32*, disable it at *line 34* (we cannot slide it before the sprite sheet image has been loaded), and we display the current sprite number 0 in the `<output>` field at the right of the slider (*line 35*).
Finally, *in lines 37-39*, we load the sprite sheet image.

- *Lines 42-58*: this callback is only run after the sprite sheet image has been loaded. We enable the slider, then set the big canvas to the size of the loaded image, then draw it (*line 51*). We also draw the first sprite from the sprite sheet in the small canvas, and draw a red wireframe rectangle around the first sprite in the sprite sheet (*lines 52-58*).
- *Lines 61-87*: the input listener callback, called each time the slider moves. *Lines 65-68* are the most important ones here: we compute the x and y position of the sprite selected with the slider. We take into account the number of sprites per posture, the number of rows, the width and height of each sprite. Then, as in the previous step, we draw the current sprite in the small canvas and highlight the current sprite with a red rectangle in the sprite sheet.

The code is generic enough to work with different kinds of sprite sheets. Adjust the global parameters in bold at *lines 1-5* and try the extractor.

Example 2: here is the same application with another sprite sheet. We just changed these parameter values: try the same code but with another sprite sheet (the one with the robot) - see on JSBin:



Now it's time to see how we can make a small sprite animation framework!