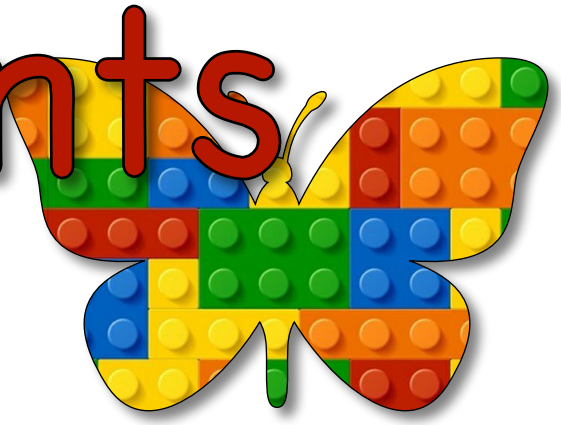
Artificial Intelligence Module B Unit #6 pretrained body Segments



Content

Module B Unit #6 body segmentation

Introduction to pretrained body segmentation

The ml5.js BodySegmentation provides two models, SelfieSegmentation and BodyPix. The SelfieSegmentation model focuses on segmenting the human subject from the background. The BodyPix model is primarily used for detailed body part segmentation (e.g., distinguishing between different limbs) in images and videos. Although BodyPix can also perform person/background segmentation, it is more computationally intensive.
The ml5.js BodySegmentation is built on top of the TensorFlow.js BodyPix model and the MediaPipe Selfie Segmentation model.

It provides following functionalities:

中 Real-time person/background segmentation:
The SelfieSegmentation model can segment people from the background in real-time, and is designed to be lightweight. The BodyPix model can also be used for this purpose, but is more computationally intensive.

中 Real-time body part segmentation:
The BodyPix model can segment 24 body parts in real-time.

中 The parts list with reference number:

```
LEFT_FACE: 0
RIGHT_FACE: 1
LEFT_UPPER_ARM_FRONT: 2
LEFT_UPPER_ARM_BACK: 3
RIGHT_UPPER_ARM_FRONT: 4
RIGHT_UPPER_ARM_BACK: 5
LEFT_LOWER_ARM_FRONT: 6
LEFT_LOWER_ARM_BACK: 7
RIGHT_LOWER_ARM_FRONT: 8
RIGHT_LOWER_ARM_BACK: 9
LEFT_HAND: 10
RIGHT_HAND: 11
TORSO_FRONT: 12
TORSO_BACK: 13
LEFT_UPPER_LEG_FRONT: 14
```

```
LEFT_UPPER_LEG_BACK: 15
RIGHT_UPPER_LEG_FRONT: 16
RIGHT_UPPER_LEG_BACK: 17
LEFT_LOWER_LEG_FRONT: 18
LEFT_LOWER_LEG_BACK: 19
RIGHT_LOWER_LEG_FRONT: 20
RIGHT_LOWER_LEG_BACK: 21
LEFT_FOOT: 22
RIGHT_FOOT: 23
```

We will be using bodyPix for this unit

Sketch B6.1 our basic sketch

Here we have created our video and flipped it as per usual

```
let video

function setup()
{
  createCanvas(640, 480)
  video = createCapture(VIDEO, {flipped: true})
  video.size(640, 480)
  video.hide()
}

function draw()
{
  background(220)
  image(video, 0, 0)
}
```

Notes

You should have a video of you in the canvas area

Sketch B6.2 preload

Loading the pretrained bodySegmentation model in ml5.js

```
let video
let body

function preload()
{
  body = ml5.bodySegmentation('BodyPix')
}

function setup()
{
  createCanvas(640, 480)
  video = createCapture(VIDEO, {flipped: true})
  video.size(640, 480)
  video.hide()
}

function draw()
{
  background(220)
  image(video, 0, 0)
}
```

Notes

Only the video of you

Code Explanation

`body = ml5.bodySegmentation('BodyPix')`	Loading the bodySegmentation pretrained model, BodyPix version

Sketch B6.3 masking the body parts

We want the options to mask the body parts

```
let video
let body

let options = { maskType: 'parts'}

function preload()
{
  body = ml5.bodySegmentation('BodyPix', options)
}

function setup()
{
  createCanvas(640, 480)
  video = createCapture(VIDEO, {flipped: true})
  video.size(640, 480)
  video.hide()
}

function draw()
{
  background(220)
  image(video, 0, 0)
}
```

Notes

Still just the video of you

🛠️ Code Explanation

`let options = { maskType: 'parts'}`	We want it to identify and mask over the main body parts

Sketch B6.4 start detecting your body parts

Using the function `detectStart()` and have the call back `gotResults()`

```
let video
let body

let options = { maskType: 'parts'}

function preload()
{
  body = ml5.bodySegmentation('BodyPix', options)
}

function setup()
{
  createCanvas(640, 480)
  video = createCapture(VIDEO, {flipped: true})
  video.size(640, 480)
  video.hide()
  body.detectStart(video, gotResults)
}

function draw()
{
  background(220)
  image(video, 0, 0)
}
```

Notes

As you might guess we get an error message because we haven't created the `gotResults()` function yet

Sketch B6.5 gotResults()

Now we add the `gotResults()` function. This includes a variable called `segmentation` (made up name) to hold the results. We need this when we draw the segmented version of you.

```
let video
let body
let segmentation

let options = { maskType: 'parts'}

function preload()
{
  body = ml5.bodySegmentation('BodyPix', options)
}

function setup()
{
  createCanvas(640, 480)
  video = createCapture(VIDEO, {flipped: true})
  video.size(640, 480)
  video.hide()
  body.detectStart(video, gotResults)
}

function draw()
{
  background(220)
  image(video, 0, 0)
}
```

```
function gotResults(results)
{
  segmentation = results
}
```

Notes

Next we want to draw the segmented version of you.

Sketch B6.6 detecting your segments

If we have detected the your segments then it will draw them otherwise nothing will happen. Also include webgl backend, flip the segmented image.

```
let video
let body
let segmentation

let options = { maskType: 'parts', flipped: true}

function preload()
{
  ml5.setBackend('webgl')
  body = ml5.bodySegmentation('BodyPix', options)
}

function setup()
{
  createCanvas(640, 480)
  video = createCapture(VIDEO, {flipped: true})
  video.size(640, 480)
  video.hide()
  body.detectStart(video, gotResults)
}

function draw()
{
  background(220)
  image(video, 0, 0)
  if (segmentation)
  {
```

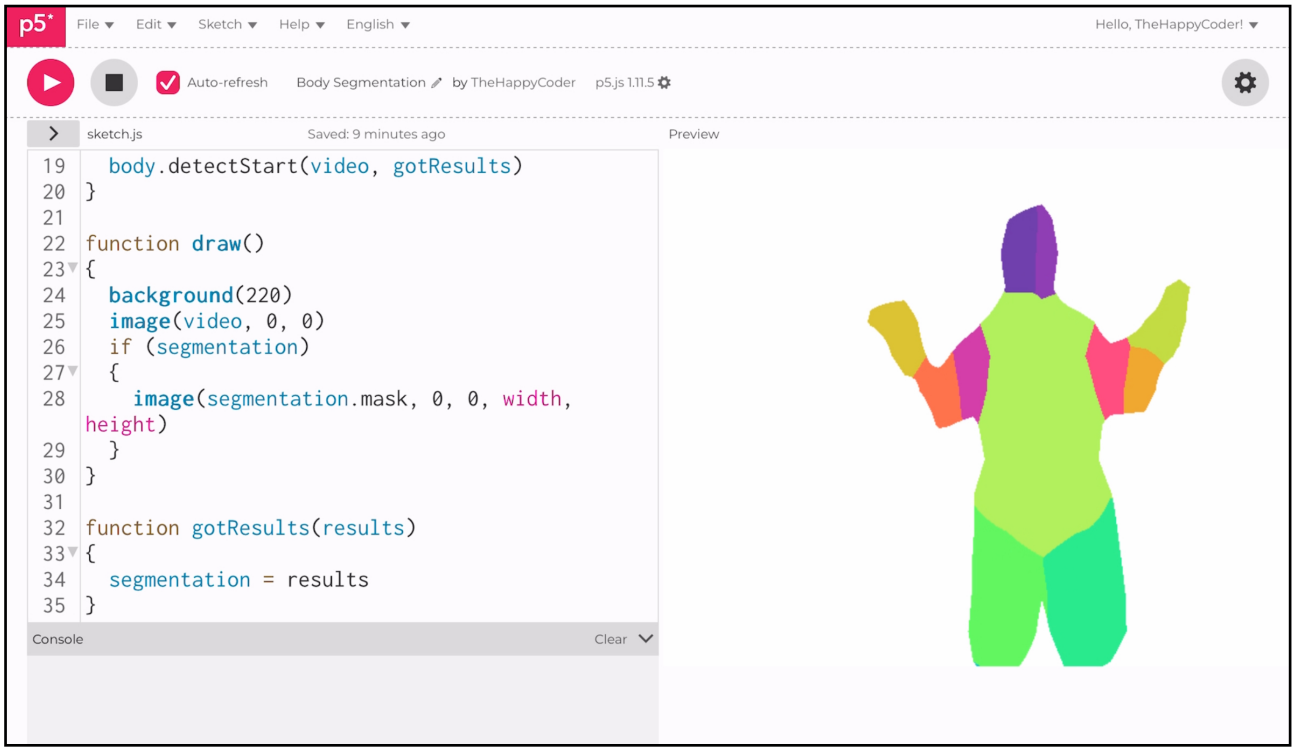
```
    image(segmentation.mask, 0, 0, width, height)
  }
}

function gotResults(results)
{
  segmentation = results
}
```

📝 Notes

You should get something like the figure below, it was far from perfect but maybe a better camera or processor (use cpu or gpu for backend) might yield better results.

Figure B6.6


p5*
File
Edit
Sketch
Help
English
Hello, TheHappyCoder!
Auto-refresh
Body Segmentation
by TheHappyCoder
p5.js 1.11.5
sketch.js
Saved: 9 minutes ago
Preview
19 body.detectStart(video, gotResults)
20 }
21
22 function draw()
23 {
24 background(220)
25 image(video, 0, 0)
26 if (segmentation)
27 {
28 image(segmentation.mask, 0, 0, width, height)
29 }
30 }
31
32 function gotResults(results)
33 {
34 segmentation = results
35 }
Console
Clear

Sketch B6.7 selecting a body part

We can highlight and play with our body parts, this is just an illustration or suggestion for how you might use it

```
let bodySegmentation
let video
let segmentation

let options = {
  maskType: "parts",
}

function preload()
{
  bodySegmentation = ml5.bodySegmentation("BodyPix", options)
}

function setup()
{
  createCanvas(640, 480)
  video = createCapture(VIDEO)
  video.size(640, 480)
  video.hide()
  bodySegmentation.detectStart(video, gotResults)
}

function draw()
{
  background(255)
  image(video, 0, 0)
  if (segmentation)
  {
```

```
    let parts = bodySegmentation.getPartsId()
    let gridSize = 10
    for (let x = 0; x < video.width; x += gridSize)
    {
      for (let y = 0; y < video.height; y += gridSize)
      {
        if (segmentation.data[y * video.width + x] ==
parts.TORSO_FRONT)
        {
          fill(255, 0, 0)
          noStroke()
          circle(x, y, gridSize)
        }
      }
    }
  }
}

function gotResults(result)
{
  segmentation = result
}
```

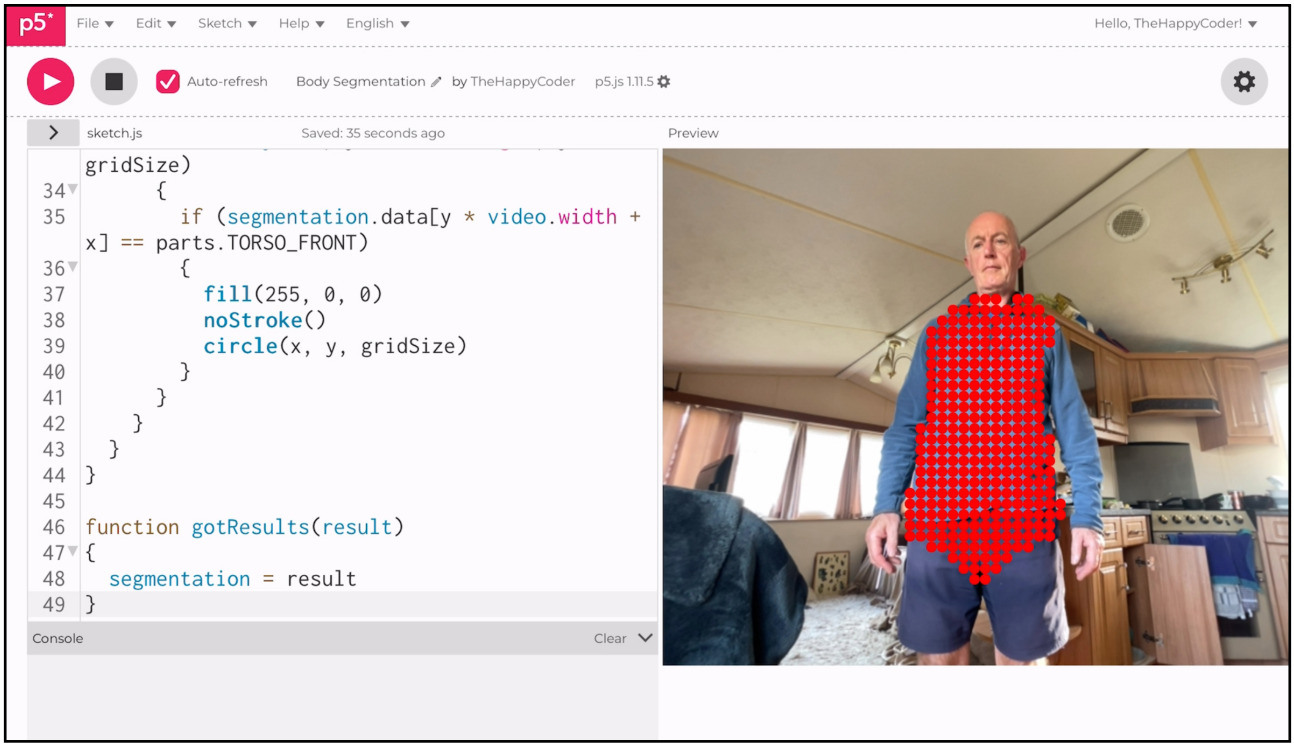
🗒️ Notes

You will cover your torso with lots of red dots

🌻 Challenge

Try another part of your body

Figure B6.7


p5*
File
Edit
Sketch
Help
English
Hello, TheHappyCoder!
Auto-refresh
Body Segmentation
by TheHappyCoder
p5.js 1.11.5
sketch.js
Saved: 35 seconds ago
Preview
gridSize)
{
if (segmentation.data[y * video.width +
x] == parts.TORSO_FRONT)
{
fill(255, 0, 0)
noStroke()
circle(x, y, gridSize)
}
}
}
}
}
function gotResults(result)
{
segmentation = result
}
Console
Clear