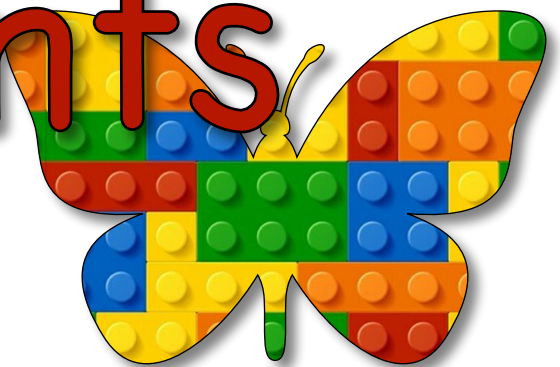


Artificial
Intelligence
Module B
Unit #6
pretrained
body

Segments





Module B Unit #6 body segmentation

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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 the 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 pre-trained 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 having the callback `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 your segments, then it will draw them; otherwise, nothing will happen. Also, include webgl backend and 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)
```

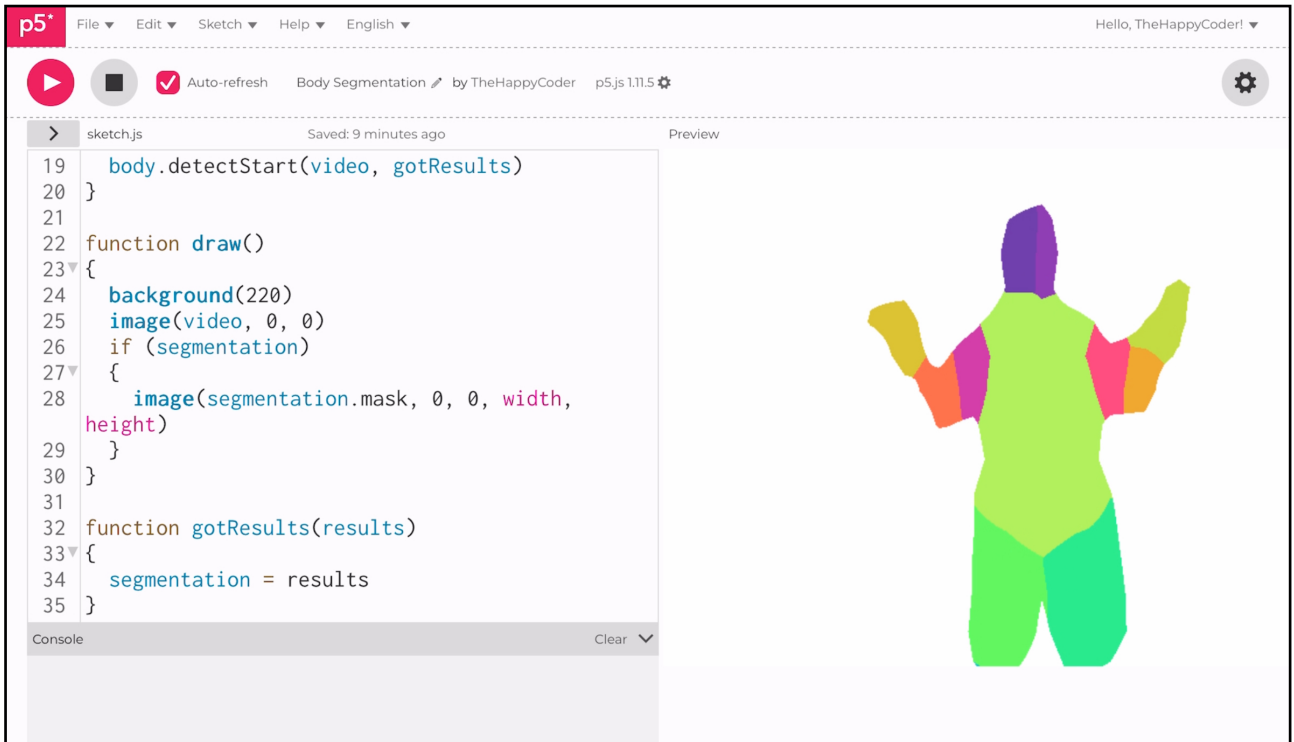
```
{  
    image(segmentation.mask, 0, 0, width, height)  
}  
  
function gotResults(results)  
{  
    segmentation = results  
}
```



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





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

