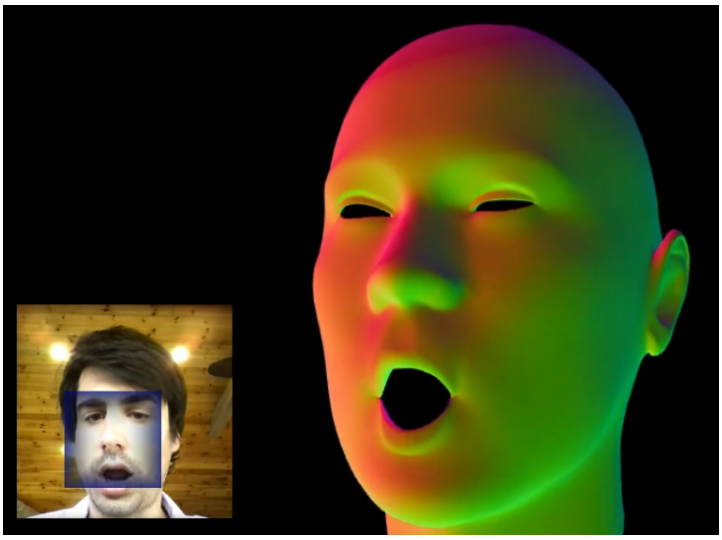
JEELIZFACEEXPRESSIONS

XAVIER BOURRY (JEELIZ)



1 INTRODUCTION

JEELIZFACEEXPRESSIONS is an API to detect the user emotions and the rotation of the head from a video stream. *JEELIZFACEEXPRESSIONS* get the videostream, instantiate the neuron network and give in real-time user emotions. It is used by *WEBOJI* API. The 2 API have been separated because *JEEFACETRANSFER* could be used for other purpose than webojis. For example to detect if a client is satisfied or the mental state of a driver. *JEELIZFACEEXPRESSIONS* does not require *THREE.js*.

2 INTEGRATION

The application requires :

- The script **jeefacetransferNNC.js**,
- It is not launched directly, *WEBOJI* or other API should use *JEEFACETRANSFER*,
- A <*canvas*> element in the DOM. The video of the user with the detection window could be displayed on this canvas.

3 ATTRIBUTES (READ ONLY)

- *JEELIZFACEEXPRESSIONS.ready* : boolean, if the virtual fitter is ready or not

4 METHODS

4.1 Pre-init methods

All these methods SHOULD be called before *JEELIZFACEEXPRESSIONS.init()*.

- *JEELIZFACEEXPRESSIONS.set_size(<integer> widthPx, <integer> heightPx)* : This function SHOULD be called before every other call, even *JEELIZFACEEXPRESSIONS.init()*. It sets the dimensions of the canvas in pixels,
- *JEELIZFACEEXPRESSIONS.onWebcamAsk(<function> callback)* : launch the callback just before asking for the webcam,
- *JEELIZFACEEXPRESSIONS.onWebcamGet(<function> callback)* : launch the callback just after getting the webcam video stream,
- *JEELIZFACEEXPRESSIONS.onContextLost(<function> callback)*: launch the callback if the webgl context is lost.

4.2 General methods

- *JEELIZFACEEXPRESSIONS.init(<object> spec)*: Init the library. *spec* is a dictionnary with the following properties :

  - <*string*> *canvasId*: ID of the <*canvas*> element,
  - <*HTMLCanvasElement*> *canvas*: alternative to <*canvasId*>,
  - <*string*> *NNCpath*: Where to find the neuron network model,
  - <*string*|*object*> *NNC*: If *NNCpath* is not defined, JSON string content or parsed of the neuron network file,
  - <*function*> *callbackReady(<string> errCode)* : callback function. If there is no error, *errCode* is set to *false*. See next section for the error codes,
  - <*object*> *videoSettings*: dictionnary which overrides WebRTC MediaConstraints. It has the following properties:
    * *videoElement*: <*video*> element used. Not set by default. Useful to use a custom video. If specified, all other video settings are not used. A <*canvas*> or <*img*> element can also be provided,
    * *deviceId*: ID of the device, not set by default,
    * *facingMode*: default: *'user'*. to use the rear camera, set to *'environment'*,
    * *idealWidth*: ideal video width in pixels. default: *320*,
    * *idealHeight*: ideal video height in pixels. default: *240*,
    * *minWidth*: min video width in pixels. default: *240*,
    * *maxWidth*: max video width in pixels. default: *1280*,
    * *minHeight*: min video height in pixels. default: *240*,
    * *maxHeight*: max video height in pixels. default: *1280*,
    * *isAudio*: whether there is audio track or not. default: *false*.

- *JEELIZFACEEXPRESSIONS.onLoad(<function> callback)*: launch the callback function if JEELIZFACEEXPRESSIONS is ready, otherwise wait until it is ready,
- *JEELIZFACEEXPRESSIONS.switch_sleep(<bool> isSleep)*: Stop the detection and the rendering loop, to save resources. It should be called when the fitter/viewer is not displayed,
- *JEELIZFACEEXPRESSIONS.get_cv()*: return the DOM element of the video canvas,
- *JEELIZFACEEXPRESSIONS.get_video()*: return the <*video*> element,
- *JEELIZFACEEXPRESSIONS.get_videoStream()*: return the WebRTC raw video stream. It can be useful to record the audio track,
- *JEELIZFACEEXPRESSIONS.switch_displayVideo(<boolean> isDisplayVideo)*: if true, display the video of the user on the DOM canvas element, with a marker to delimit the face. Can be used before the initialization of the API.
- *JEELIZFACEEXPRESSIONS.on_detect(<function> callback)*: Launch the callback function if the face is detected or when the detection is lost. The callback is called with 1 argument, *true* if the face is detected, *false* if the detection is lost,

- *JEELIZFACEEXPRESSIONS.set_animateDelay(<integer> delay)* : Change the delay between 2 detections. it can be helpful to free up some resources to speed up DOM transition or video encoding. The value is given in milliseconds,
- *JEELIZFACEEXPRESSIONS.set_color([<float> R,<float> G,<float>B])*: set the color of the frame (if displaying the debug view only). R,G,B are between 0 and 1. Default is $[0.0, 0.5, 1.0]$ (light blue).
- *JEELIZFACEEXPRESSIONS.destroy()*: Destroy the WebGL context, textures etc...

4.3 Initialization error codes

These error codes can be returned as first argument of *callbackReady* :

- *false*: no error occurs,
- *ALREADY_INITIALIZED*: the API has been already initialized,
- *NO_CANVASID*: no canvas ID was specified,
- *INVALID_CANVASID*: cannot found the <*canvas*> element in the DOM,
- *WEBCAM_UNAVAILABLE*: cannot get access to the webcam (the user has no webcam, or it has not accepted to share the device, or the webcam is already busy),
- *GL_INCOMPATIBLE*: WebGL is not available, or this WebGL configuration is not enough (there is no WebGL2, or there is WebGL1 without *OES_TEXTURE_FLOAT* or *OES_TEXTURE_HALF_FLOAT* extension).

4.4 Morph and rotation

These methods are used by higher level scripts (for example *WEBOJI*) to get the morph coefficients and the rotation from the neural network.

- *JEELIZFACEEXPRESSIONS.get_nMorphs()*: returns the number of morphs,
- *JEELIZFACEEXPRESSIONS.get_morphTargetInfluences()*: returns the array with the morph coefficients,
- *JEELIZFACEEXPRESSIONS.get_morphTargetInfluencesStabilized()*: returns the array with the morph coefficients stabilized,
- *JEELIZFACEEXPRESSIONS.get_morphUpdateCallback()*: function launched when the morph coefficients array is updated. The function is called with these arguments :
  - <*float*> *quality*: quality of the detection, between 0 (bad quality) and 1 (high quality),
  - <*float*> *benchmarkCoeff*: higher it is, less powerful is the computer of the user. Can be directly used as a factor of the blending coefficients for morphing amortization,
- *JEELIZFACEEXPRESSIONS.get_rotation()*: return an array with the 3 euler angles which characterize the head rotation,
- *JEELIZFACEEXPRESSIONS.get_rotationStabilized()*: same than

- *get_rotation()* method but with more stabilization and automatic rotation if the head is not found,
- *JEELIZFACEEXPRESSIONS.get_positionScale()*: return a 3 floats array, $[P_x, P_y, s]$. P_x and P_y are the 2D position coordinates (relative to viewport size, each between 0 and 1). s is the scale relative to the width (1 for full width). P_x and P_y are oriented respectively from left to right (in mirrored view) and from bottom to top.
- *JEELIZFACEEXPRESSIONS.is_detected()*: returns if the face is detected or not.