

OLIVE (OpenCV LIVE) is a web-based, visual programming tool for real-time image, video, and 3D processing. It uses **nodes** to represent functions and **wires** (connections) to define the flow of media data between them, leveraging **OpenCV.js**, **Three.js** and **MediaPipe**.

I. System Requirements and Setup

- **Browser:** A modern web browser that supports **WebGL** and **JavaScript**.
- **Dependencies:** The application loads external libraries including `opencv.js` and `three.js`.
- **Status Check:** When the editor loads, the **OpenCV status** will be displayed in the interface, turning green once the library is ready.

II. Core Editor Concepts

Component	Description	Interaction
Node	A block representing a specific function.	Add: Drop the Node into the Graph Editor . Move: Drag the Node Header (title bar). Remove: Select the Node and press Delete .
Port	Connections for data flow. Inputs (left) receive data; Output (right) sends data.	Create Connection: Click and drag from an Output Port to an Input Port .
Wire	Defines the flow of data from an output to an input.	Delete Connection: Right-click on the Port (deletes all wires connected to that port).
Fullscreen	View media output in full screen.	Double-click on the image/video/canvas element <i>inside</i> a node.
File	Load and save graphs in JSON format.	Click the Save icon to save your project. Click the Open icon to load a project. Local image and video files must be in the same folder as the project (.olive) file.

III. Node Catalog and Functionality

Nodes are organized into categories based on their role in the workflow.

1. Input Nodes

These nodes provide the starting media source for your graph.

- **Image / Video:** Upload a static image or video file or provide a link.
- **Camera:** Capture a live video feed from your device's camera.
- **Parametric Lines:** Change the parameters and generate animated curves.

2. Processing Nodes

These nodes perform image and video manipulation using **OpenCV.js**.

Node Title	Primary Functionality	Key Controls & Parameters
Gamma Correction	Changes pixels' intensities.	Adjust γ value.
Histogram Equalization	Equalizes the histogram, globally or locally.	Adjust the Grid Size for CLAHE (Contrast Limited Adaptive Histogram Equalization)
Color Adjustment	Manipulates the HSV color space.	Use the Color Picker to define the color (or the target range) and the sliders for new Hue and Saturation values. Includes Full Range and Invert options.
Convolution	Applies spatial filtering.	Select Filter Type (e.g. Gaussian Blur, Sobel Edges) and adjust Kernel Size or define a Custom Kernel .
Morphology Rank	Applies morphological operations and ranking filters.	Select Filter Type (e.g. Erosion, Dilation, Median), Kernel Size , and Kernel Shape (Rectangle, Ellipse, Cross).
Polar Transformation	Warps the image using coordinate transformations.	Select Effect Type (Fish Eye, Cone, Swirl) and Effect Strength .
Glitch Effects	Applies dynamic visual distortions.	Select Effect Type (Shaking, Aberration, Fade, Glass) and Effect Strength .
Thresholding	Binarizes the color channels, using a global or local threshold.	Adjust the Threshold Value and select the Type (Binary, Otsu, Adaptive).
Matrix Operations	Adds, subtracts, multiplies, divides two images or applies min/max operations.	Select the Operation Type and the Weights for the inputs.
Channel Mixer	Remixes the RGB channels.	Adjust the Percentage of Red , Green and Blue at every color channel.
Color Blending	Replaces the color (e.g. Hue, Saturation) of an image with the color of another.	Select the HSV channels (Hue, Saturation, Value) to be replaced.

Concatenation	Merges the input images either horizontally or vertically.	Adjust the percentage of Overlap with the slider.
Transitions	Classic WebGL transitions between two inputs.	Select Transition Type (e.g. Fade, Wipe, Radial, Dissolve) and adjust the Transition Duration .
Connected Components	Finds superpixels in the input image.	Adjust the Threshold Value for the Segmentation .
Background Subtraction	Removes non-moving objects (background) from the input video.	No controls.
Optical Flow	Visualizes the optical flow with arrows.	Adjust the Block Size .
Skeleton	Applies the Distance Transform to the RGB channels.	No controls.

3. Rendering Nodes

They render the input texture onto a **3D geometry** using **Three.js**.

- **Projection:** A specialized node that uses the input as a **projected texture** onto the scene. Use the mouse to **orbit and zoom** the camera. A spherical indicator represents the **Projector** which can be dragged using **Drag Controls**.
- **Mapping / Lighting:** UV mapping of the input image/video on a **GLTF Model** or a Plane, Cube, Sphere etc. The spherical indicator represents a **Point Light**. Adjust light's color and intensity with the color picker and the sliders.
- **3D Text:** renders custom 3D text (has no Input Port). Adjust content, font, color and size.

4. Pose-Estimation Nodes

They track the human body using the **MediaPipe** library.

- **Human Pose:** Applies segmentation to the person (if any) and removes the background.
- **Character Animation:** pose-driven movement of an uploaded **VRM humanoid model**.

5. Output Node

This node does not have an Output Port.

- **Canvas Viewer:** This is the final step in the graph. It displays the result of the connected node.