REPORT

Date: 10th April 2023

This is the current report about the assigned work to us. We have switched from MATLAB to OpenCV since we have tried in MATLAB and we couldn't figure out as we are not familiar with it.

Progress in main task

- Shifted from MATLAB to OpenCV
- Loaded video and obtained corresponding frame.
- Plotted boundary of the necessary contour
- Obtained the vertices.
- Formed a new contour to find area.
- Masked the area.
- Found the area using cv2.contourArea**()**

cv2.contourArea():

The **cv2.contourArea()** function in OpenCV computes the area of a closed contour or a polygon. It works by applying Green's theorem, which calculates the area enclosed by a curve by integrating over the boundary of the curve.

Green's theorem states that the area enclosed by a simple closed curve **C** oriented counter clockwise is given by:

$$\text{Area}(C) = 0.5 * \text{sum}(x_i * y_{i+1} - y_i * x_{i+1})$$

where (x_i, y_i) are the coordinates of the ith vertex of the curve and the summation is taken over all vertices of the curve.

The cv2.contourArea() function applies this formula to the vertices of the input contour or polygon to compute its area.

Why cv2.contourArea**():**

The cv2.contourArea() function in OpenCV is a widely used function to calculate the area of a contour. It computes the area of a closed contour using the Green's theorem, which states that the area enclosed by a closed contour can be computed by integrating the dot product of the position vector with the tangent vector over the boundary of the contour. This means that the function computes the area by calculating the sum of the areas of the individual triangles that make up the contour.

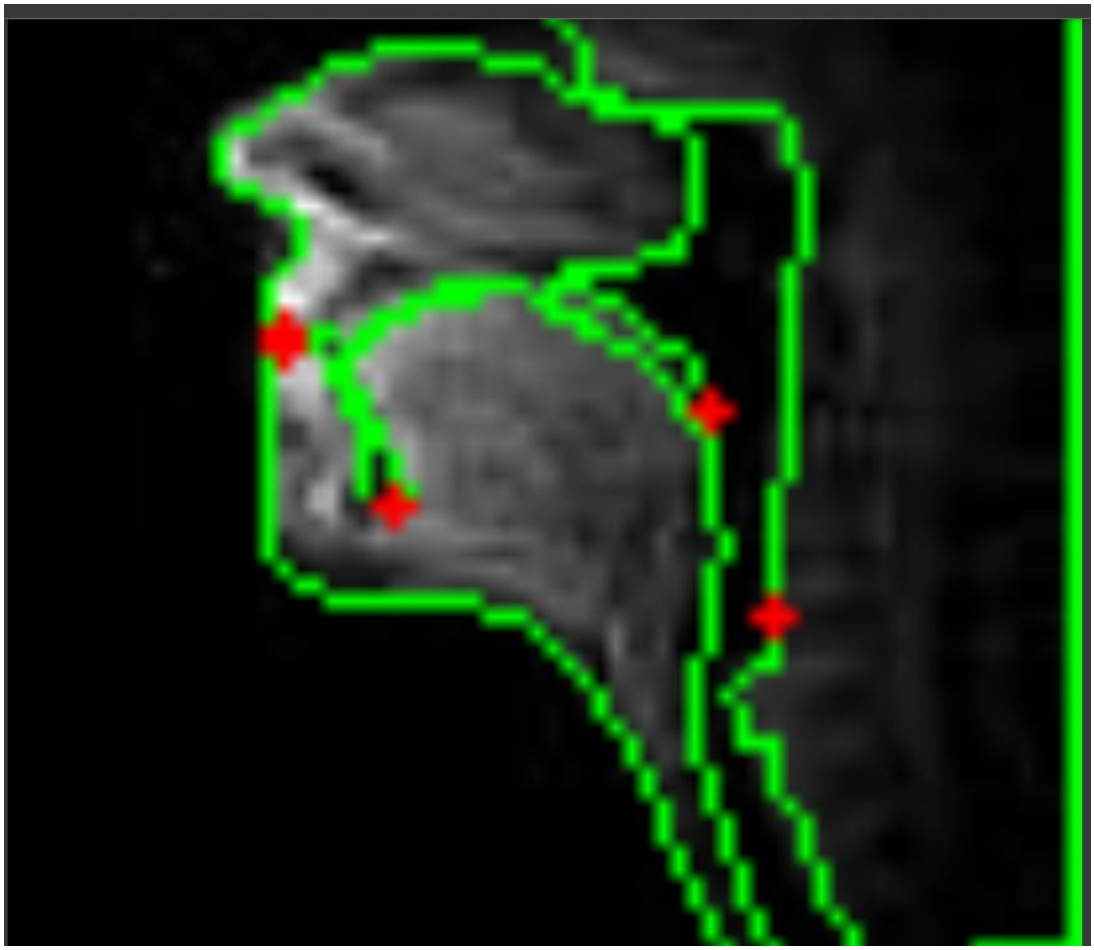
The cv2.contourArea() function is widely used due to its ease of use and accuracy. It has been extensively tested and validated, and is known to provide accurate area calculations for a wide range of contours. Additionally, it is a built-in function in the OpenCV library, which makes it easily accessible to developers.

Therefore, the cv2.contourArea() function is a reliable and efficient way to calculate the area of a contour, and is commonly used in various computer vision applications.

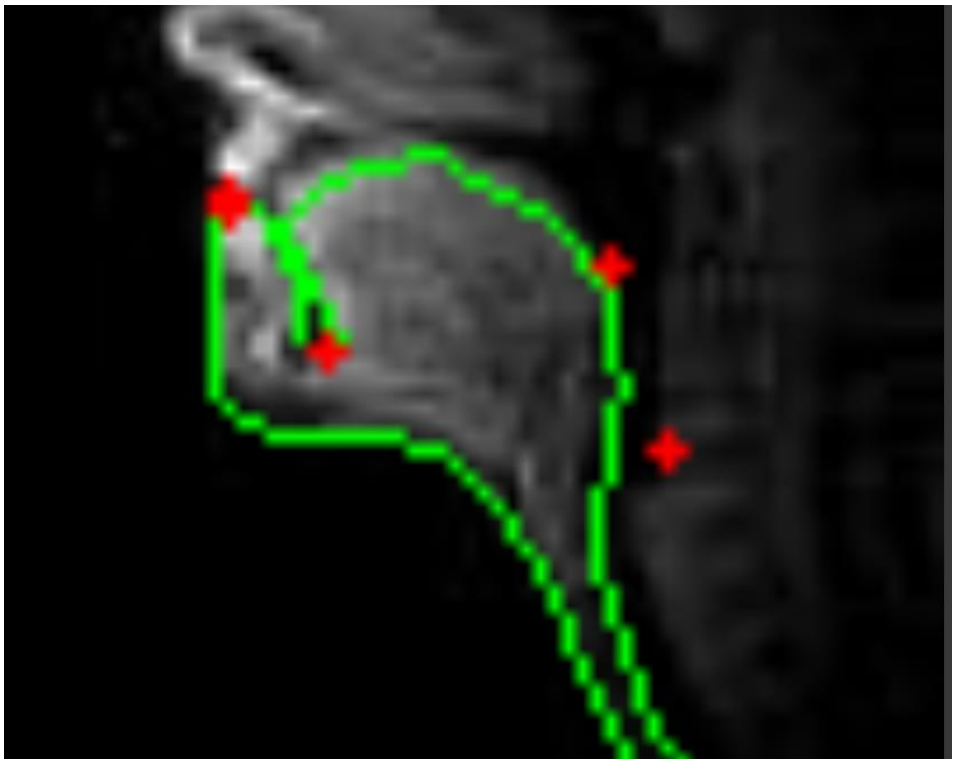
AIM: To find the area of the tongue.

PROCEDURE AND OBTAINED RESULT

1. Loaded the video and mat file and then plotted all the contours and the point

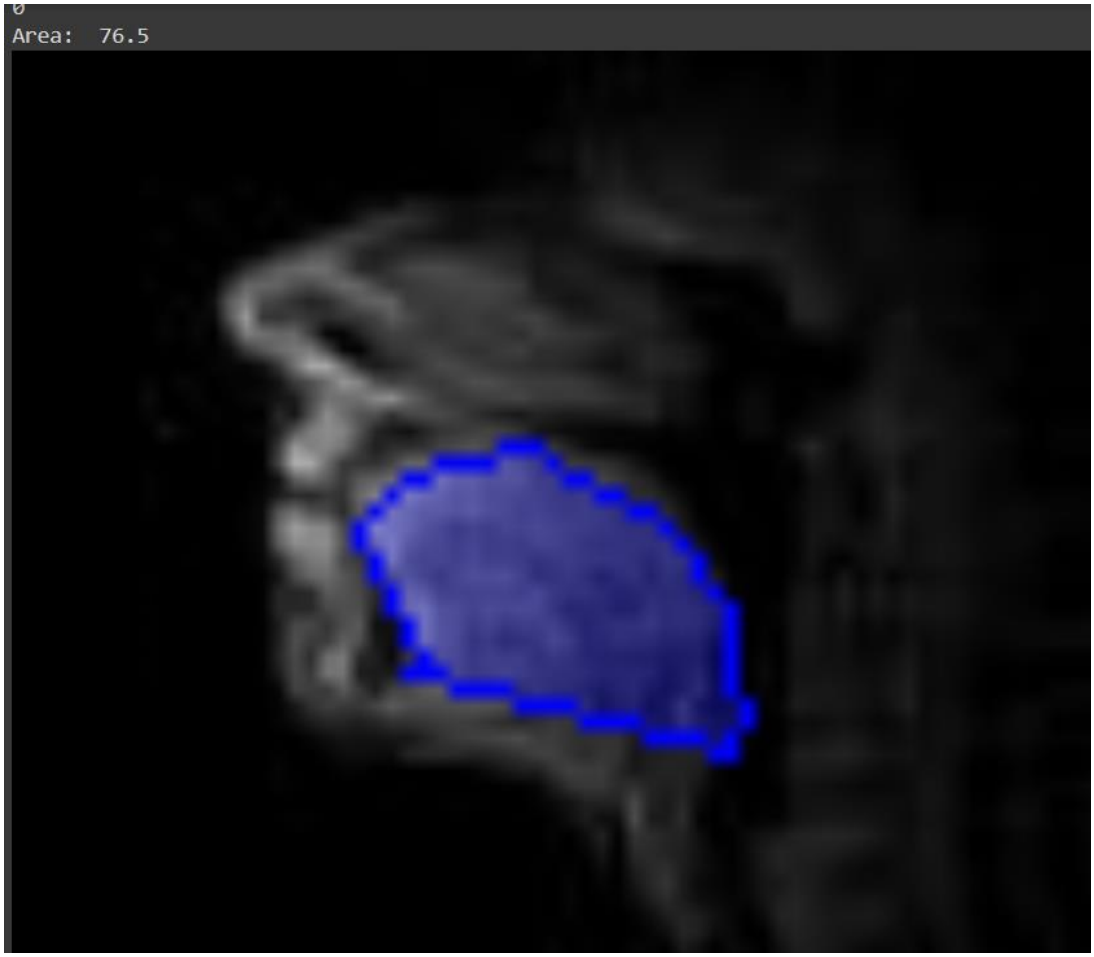


2. Obtained the needed contour 2



3. Obtained the nearest point from GLTB to contour 2 and plotted the required contour by joining AVR and the newly found point on contour 2

4. Obtained the new contour using cv2.findContours and then found the area using cv2.contourArea().



REFERENCES:

- The Maths behind Contour Moments from OpenCV: https://medium.com/@aleozlx/the-maths-behind-contour-moments-from-opencv-491e5c348b91
- How to compute the area and perimeter of an image contour using OpenCV Python?: https://www.tutorialspoint.com/how-to-compute-the-area-and-perimeter-of-an-image-contour-using-opencv-python