

EXPT. NO:10  
DATE: 30.04.2024

## **LOCATION OF LAPAROSCOPIC TOOLS USING MATLAB**

### **AIM:**

To locate the Laparoscopic tools using Matlab.

### **SOFTWARE USED:**

MATLAB version 2014a.

### **THEORY:**

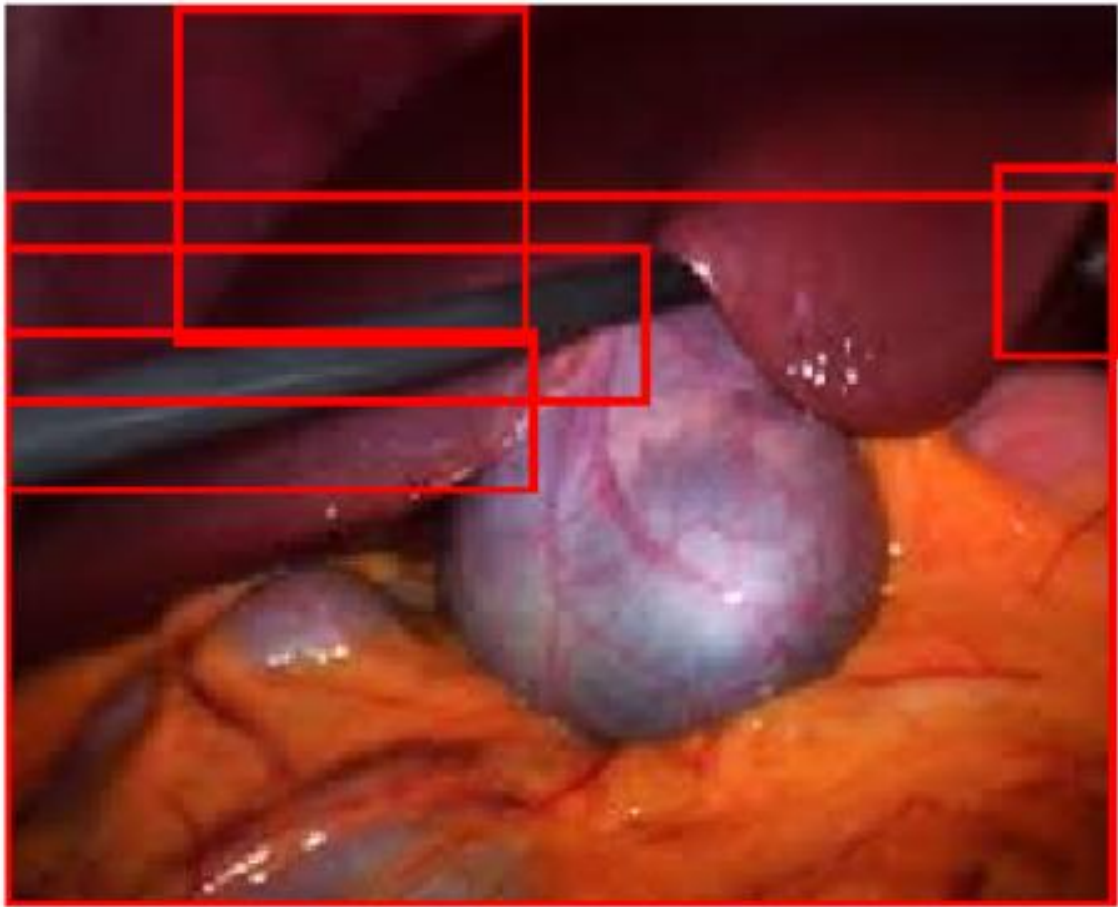
In laparoscopic surgery, the precise localization of surgical tools within the abdominal cavity is crucial for the safety and success of the procedure. MATLAB offers various techniques for achieving accurate tool localization in laparoscopic images.

One common approach involves image processing and computer vision algorithms to detect and track the position of surgical instruments in real time. This often begins with pre-processing steps such as image enhancement and background subtraction to improve the visibility of the tools against the surgical field.

Feature extraction methods, such as edge detection or template matching, can then be applied to identify the shape and contours of the instruments. Additionally, machine learning techniques, such as convolutional neural networks (CNNs), can be trained on annotated datasets to automatically recognize and localize surgical tools in laparoscopic images. By combining these methodologies, MATLAB facilitates the development of robust and efficient tool localization systems that enhance the precision and efficiency of laparoscopic surgeries, ultimately improving patient outcomes and reducing surgical risks.

**OUTPUT:**

**Detected Regions in Laparoscopic Image**



## PROGRAM:

```
% Read the laparoscopic image
laparoscopicImage = imread('gynaecology-laparoscopy_cv.jpg');

% Convert the image to grayscale
grayImage = rgb2gray(laparoscopicImage);

% Perform edge detection using Canny method
edgeImage = edge(grayImage, 'Canny');

% Perform morphological operations to enhance edges
se = strel('disk', 2);
dilatedEdgeImage = imdilate(edgeImage, se);
erodedEdgeImage = imerode(dilatedEdgeImage, se);

% Find connected components in the edge-detected image
connectedComponents = bwconncomp(erodedEdgeImage);

% Get properties of connected components
properties = regionprops(connectedComponents, 'Area', 'BoundingBox');

% Filter out small regions
minAreaThreshold = 100;
validRegions = properties([properties.Area] > minAreaThreshold);

% Display the original image with detected regions
figure;
imshow(laparoscopicImage);
hold on;
for i = 1:numel(validRegions)
    rectangle('Position', validRegions(i).BoundingBox, 'EdgeColor', 'r', 'LineWidth', 2);
end
hold off;
title('Detected Regions in Laparoscopic Image');
```

## RESULT:

Location of Laparoscopic tools using MATLAB has been studied and verified successfully.