# AUTOMATIC SEGMENTATION OF STOMACH AND INTESTINES ON MRI SCANS OF CANCER PATIENTS

## Literature review of work used :

**Paper title**: Segmentation precision of abdominal anatomy for MRI-based radiotherapy

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## Summary:

Through this paper they highlighted the advantages of MRI for target delineation in patients with abdominal cancer, which may provide more accurate representation of the tumour. However, despite these findings MRI-based radiotherapy for abdominal sites has remained largely unstudied. So, in this study, they evaluated the use of abdominal MR images for segmentation by characterising the interobserver and intraobserver precision of normal tissue delineation on MR images .

By assessing this kind of segmentation precision of abdominal anatomy offered by MRI. They aimed to gain insight into its potential utility for planning and localization of patients with abdominal cancer. Overall, metrics indicated good interobserver/intraobserver precision (mean DC > 0.7, mean HD < 4 mm). Results suggest that MRI offers good segmentation precision for abdominal sites. These findings support the utility of MRI for abdominal planning and localization, as emerging MRI technologies, techniques, and onboard imaging devices are beginning to enable MRI-based radiotherapy.

# Our Project Findings:

## Aim:

To improve accuracy of our model for precise segmentation of intestine and stomach on MRI of cancer patients, to provide them better care and treatment.

## Methodology Used:

- A Deep Learning based model to provide more accurate results, to eliminate potential errors.

- Using AI models and Algorithms, various python libraries like keras, matplotlib, tensorflow, etc. which provide various methods to analyse and train models to perform and predict in a more precise manner in the future.

## Metrics involved for testing the accuracy of prediction:

The DC provides a measure of volumetric overlap between the two 3-D structures and is computed as:

$$DC=2|X\cap Y||X|+|Y|$$

Here, X and Y represent two 3D contour structures. The DC ranges from 0 to 1, with a value of 0 indicating no overlap, and a value of 1 indicating perfect overlap.

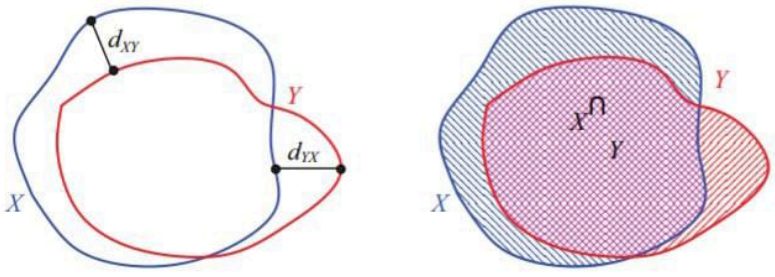


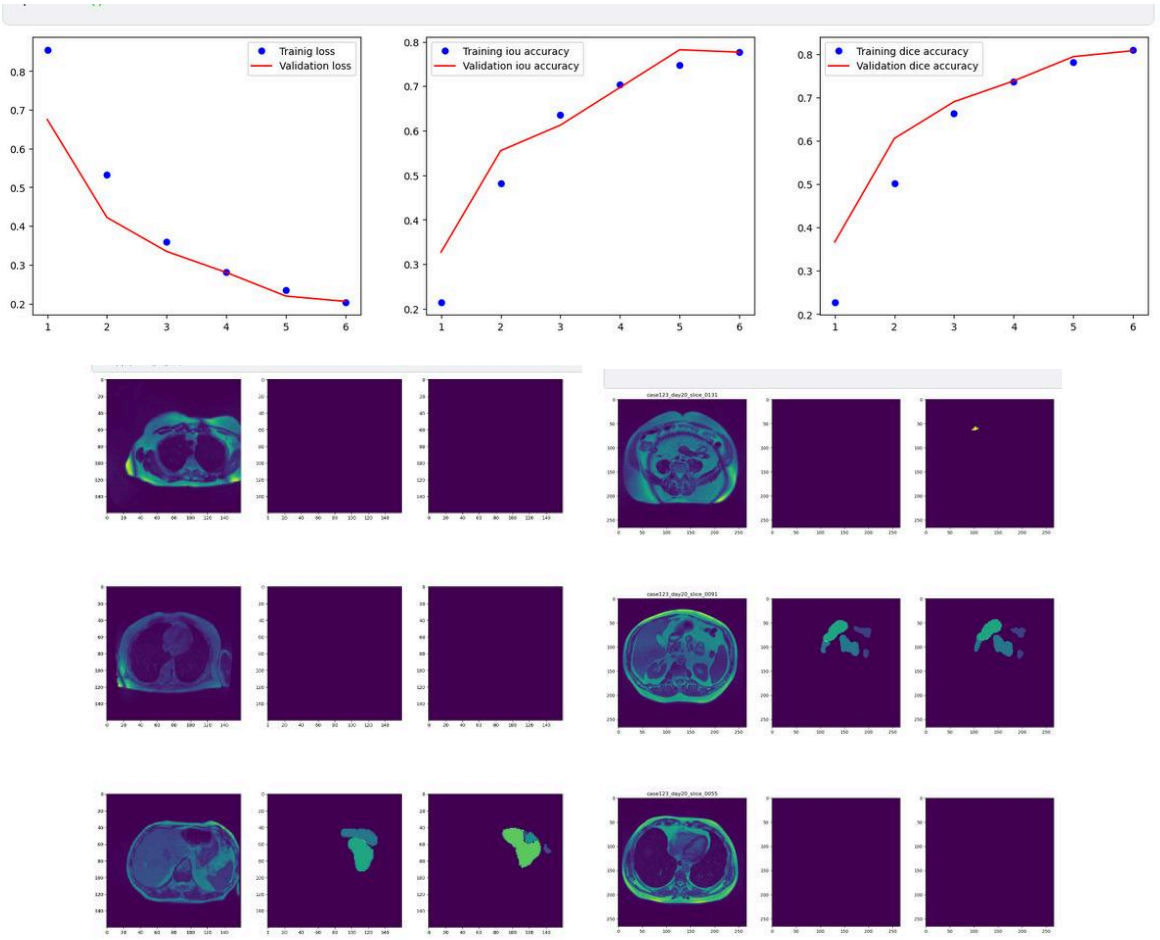

**Fig. 1.** Illustration of the evaluation metrics: Hausdorff distance (left) and the parameters of the Dice metric (right).

The HD is used as a metric of surface agreement by providing a measure of the maximum value in the set of nearest distances between 2 sets of contour points and is computed as

$$\mathrm{HD} = \max\left\{ \max_{x \in X} \min_{y \in Y} \mathrm{d}(x, y), \min_{y \in Y} \max_{x \in X} d(x, y) \right\} \quad (2)$$

Here, X and Y represent two 2D contours on the same axial image slice, and x and y represent the finite points contained on contours X and Y. The maximum Euclidean distance between these 2 sets of points is computed as the HD. The median is used because it provides a better measure of central tendency for the distribution of HDs, which was skewed toward high values (positively skewed) for most structures. Low values indicate a high level of contouring precision, whereas high values indicate poor precision.

# RESULTS:




# Conclusion:

These findings support the utility of MRI for abdominal planning and localization, as emerging MRI technologies, techniques, and onboard imaging devices are beginning to enable MRI-based radiotherapy. This will enable radiation oncologists to deliver higher doses of radiation to tumours while avoiding the stomach and intestines, making treatments faster and more effective with fewer side effects and better long-term cancer control. The report can be considered once getting it reviewed by an expert in that field.

# FUTURE SCOPE:

This approach can be further used to implement MRI scans of  different soft tissue areas not only abdominal areas in future. It will make it easy to detect organs and provide a solution by protecting the living parts to make it efficient and less life threatening .