**SUMMARY**

The precise segmentation of brain tumors is essential for the diagnosis and treatment of brain cancer. Unfortunately, manual segmentation is a time-consuming, subjective, and error-prone operation. To aid in the identification and treatment of brain cancer, the development of an accurate and efficient automated system for brain tumor segmentation is important. This study intends to overcome this issue by constructing a transformer-based segmentation model for brain tumors utilizing the BraTS dataset. Using transformer-based models, this study attempted to build an accurate and efficient technique for segmenting brain tumors. The initial phase consisted of getting the BraTS dataset, which is extensively utilized for segmenting brain tumors. After applying preprocessing techniques such as normalization and edge improvement to the data, data augmentation was utilized to produce extra training samples and boost the model's generalizability.

To manage the massive volumes of data and generate batches for training the transformer-based model, a data generator was created. On the test dataset, the model was trained using the Dice loss function and assessed using the Intersection over Union score and Dice loss. The performance of the model was then shown using comparisons of actual and anticipated images. With a test loss of 0.6518, a test Dice loss of 0.7976, and a test Intersection over Union score of 0.7481, the accuracy with which this research segmented brain tumors was deemed promising. Further research could investigate the use of multiple types of transformer, and the addition of multimodal data to enhance the accuracy of segmentation. In addition, the possibility for real-time deployment of the model in clinical settings might be examined in order to facilitate the speedy diagnosis and treatment of brain cancers. Furthermore, the interpretability of the model's predictions could be improved by employing explainable AI approaches such as attention mechanisms and saliency maps. This research proposes a viable method for segmenting brain tumors using transformer-based models, which has the potential to enhance the quality of patient treatment.