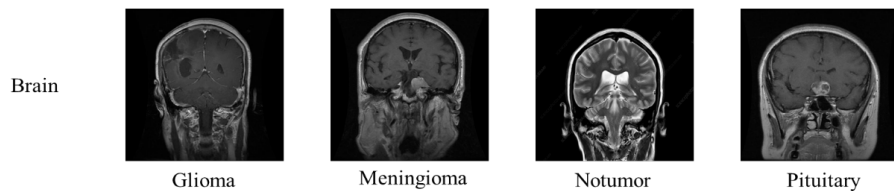


Table S. Distribution in the Brain Tumor MRI Dataset.

Brain Tumor	Class	Glioma	Neningioma	Notumer	Pituitary
MRI Dataset	Training Number	1321	1339	1595	1457
	Testing Number	300	306	405	300

1 Brain Tumor MRI Image Display

We can see the distribution of the Brain Tumor MRI Dataset in TableS. Fig.S shows some sample images of the public dataset. It is evident that different categories of brain tumor MRI images exhibit distinct texture characteristics. Despite the significant differences between brain MRI images and esophageal ultrasound endoscopic images, the texture enhancement mechanism of SRRM-ViT demonstrates clear advantages over the baseline model (ViT), achieving highly competitive results, which proves the generalizability of SRRM-ViT.

**Fig. S.** Display of typical brain tumor MRI images from public datasets.

2 Limitations

The current limitations are as follows.

1) Limitations of the method. Due to the imbalance of categories in the in-house dataset, this paper only considers the fully supervised case and does not perform unsupervised pre-training to improve performance.

2) Limitations of the labeling method. Three types of infiltrative tumors may appear at the same time, this also explains the suboptimal recall and F1-score metrics. Hence the single-label labeling method has limitations.

3) Experimental limitations. Although superior new performance was produced on the datasets of two modalities, the scalability of SRRM-ViT was not demonstrated on natural images. We leave these tasks as future work.