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## MRI Image Classification using Deep Learning

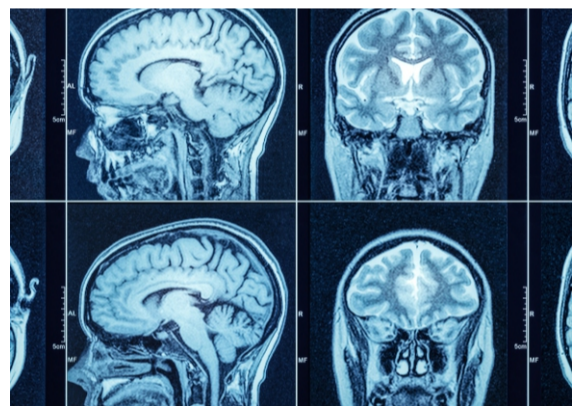


### Project Goals

Over 75% of healthcare institutions expect to be using AI/ML within the next three years. One of the domains AI is already making inroads in is to detect the brain tumors using MRI images for appropriate treatment and saving life. Although in the past, researchers have used different automated techniques for the brain tumors detection, but the recent developments in deep learning techniques have shown tremendous results and become the state of the art in the field of medical image analysis.

### Solution Design

For training the AI/ ML model, we used 3027 images, classified into four categories - glioma tumor, meningioma tumor, no tumor and pituitary tumor. This image dataset was split into Training and Test set, where 80% of the images were used for training, 10% for testing and 10% for Validation.



Average precision <span>?</span>	0.97
Precision <span>?</span>	89.7%
Recall <span>?</span>	89.1%

True label	Predicted label			
	pituitary_tumor	glioma_tumor	no_tumor	meningioma_tumor
pituitary_tumor	79	1	-	4
glioma_tumor	-	79	1	10
no_tumor	-	1	31	3
meningioma_tumor	4	9	-	80

### Results

Using the deep learning technique in the Image Classification data science workflow, we achieved over 97% of overall accuracy in classifying different images in the appropriate categories. Its ability to identify patients with a negative test without a tumor (negative predictive value) ranged from 89.1%-100%. The positive predictive value, meanwhile, fell between 89.7%-100%.

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