

## 1. Dataset

Dataset	Patients	Scans	Grade	Amount
TCGA-GBM	135	Flair, T1, T1Gd and T2	IV	135
TCGA-LGG	106	Flair, T1, T1Gd and T2	II	48
			III	58
LGG-1p19qDeletion	159	T1c and T2	II	104
			III	55

All scans in three datasets are pre-operative.

Grade II	Grade III	Grade IV
152	113	135

## 2. Preprocessing

2.1 **Skull-Stripping**: use same method to remove skull from each slice.

2.2 **Extract Tidy Brain**: remove unnecessary background.

2.3 **Scale Normalization**: resize all scans to same shape.

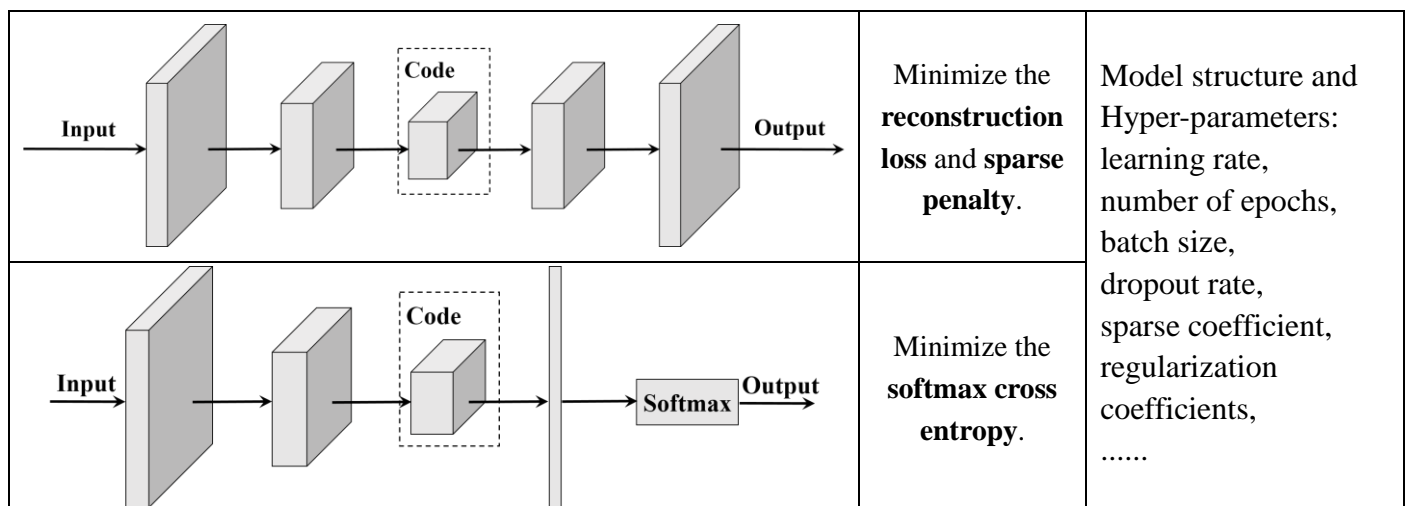
## 3. Prepare for Training

Generate training, validating and testing set.

Dataset	Proportion	Grade II	Grade III	Grade IV
Training	60%	91	68	81
Validating	20%	31	23	27
Testing	20%	30	22	27

Do **augmentation** on training set by horizontally flipping the volume.

## 4. Train Sparse Autoencoder



Use a table to record results of each training process.

## 5. Evaluation

5.1 Plot **learning curve** of loss and accuracy of each training process to evaluate parameter settings.

5.2 Compute **recall** and **precision** of three classes to describe model's sensitivity.