Generation of Patches

Step 1: Extract bounding-boxes of tumors

Grade 2: 28

Grade 3: 36

Grade 4: 102

Step 2: Extract more bounding-boxes via morphology method (dilation and erosion)

If the size of a box is smaller than threshold, its erosion will be dropped

Grade 2: 28 * 3 (dilation, erosion, origin)

Grade 3: 36 * 3 (dilation, erosion, origin)

Grade 4: 102 * 3 (dilation, erosion, origin)

Step 3: Resize bounding-boxes into same shape

Shape: ***[59, 59, 59, 4]***

Step 4: Create mirrors and modify intensity

Mirrors: horizontal flip, vertical flip, axisymmetric flip

Modify intensity of each voxel in four channels respectively, via ***increasing or decreasing intensity by 5% to 10%***

Grade 2: 28 * 3 * 4 (horizontal, vertical, axisymmetric, origin)

Grade 3: 36 * 3 * 4 (horizontal, vertical, axisymmetric, origin)

Grade 2: 102 * 3 * 2 (origin and, randomly select one from horizontal, vertical or axisymmetric flip)

Step 5: Extract partial volumes from whole volume, the shape of partial box is *[49, 49, 49, 4]*

Extract partial boxes randomly from 15 optional volumes

Grade 2: 28 * 3 * 4 * 7 (randomly choose 7 partial boxes from 15 options)

Grade 3: 36 * 3 * 4 * 6 (randomly choose 6 partial boxes from 15 options)

Grade 4: 102 * 3 * 2 * 4 (randomly choose 4 partial boxes from 15 options)

Thus, all patches are generated for three grade groups.

Tumors in BraTS2017	Grade	Amount	Morphology	Mirror & Intensity Modification	Partial Boxes	Total Patches
	2	28	3	4	7	2268
	3	36	3	4	6	2424
	4	102	3	2	4	2360

Generation of Training and Validating Dataset

Grade	Training Set	Validating Set
2	randomly select 14 cases with their patches	the other 14 cases with their patches
3	randomly select 18 cases with their patches	the other 18 cases with their patches
4	randomly select 51 cases with their patches	the other 51 cases with their patches