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In order to fully leverage the 3D spatial contextual information of volumetric data to accurately segment prostate images, we propose a 3D CNN with dense blocks connected by residual links and attention modules.

Before training the network, we resampled all MR volumes into a fixed resolution of 0.625×0.625×1.5mm and then normalized them as zero mean and unit variance. To overcome overfitting, we utilize data augmentation to augment the training data. The augmentation operations include rotation, zoom and flip.

Our network is trained end-to-end with Stochastic Gradient Descent (SGD) optimization method. In the training phase, the learning rate is initially set as 0.0001 and decreased by a weight decay of 10e-6. The momentum is set to 0.9. Due to the limitation of the memory, we chose 8 as the batch size. Experiments are carried out on a Nvidia GTX1080ti GPU with 11GB memory. During the network training, we employ a randomly cropping strategy. We randomly cropped sub-volumes in the size of 16×96×96 (d*w*h) voxels from the training data during every iteration. In the testing phase, we used overlapped sliding windows strategy to crop sub-volumes and used the average of the probability maps of these sub-volumes to get the whole volume prediction. The sub-volume size was also 16×96×96 and the stride was 8×48×48.