# DenseMedic

(Junwen Pan [i@panjunwen.com](i@panjunwen.com))

## Abstract

This document briefly describes techniques we used in automatic segmentation of the prostate in transversal T2-weighted MR images for the PROMISE12 challenge. We use a U-Net-like FCN with Dense blocks for semantic segmentation to tackle this problem. Details of each step are described as below.

## Preprocessing

Each volume is normalized to has a zero mean and a unit variance. The training data is augmented by random deformation and hist matching. We resize the image to 128x128x64 for training and test. The test result is resampled to the original size by linear interpolation.

## Network

The network consists of a down-sampling path and an up-sampling path, followed by a softmax layer for prediction. The down-sampling path follows a DenseNet-B-like network structure called Dense block, including a bottleneck (1x1 conv) and a convolution layer with stride 2. The up-sampling path uses trilinear interplolation method with factor 2 to restore the high-resolution signal and several bottleneck layers.

### Loss function

We employ dense dice without weights as loss metric which is a estimation of mean dice coefficient for each class (background and foreground).

## Evaluation

The algorithm is implemented on PyTorch with memory optimizing. The outputs of BatchNorm, ReLU and Concatenation were dropped in forward path and re-computed in backward. We use single GeForce GTX 1080 Ti GPU with 8G VRAM for training and the batch size is 2.

There is no post-processing.