Prostate MR Image Segmentation Method Using Unet and skip connection

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Abstract

This document briefly describes techniques we used in automatic segmentation of the prostate in transversal T2 MRI for the PROMISE12 challenge. We trackled this problem using U-net and skip connection.

1. Data Preprocessing

Uniform size. To unify the image sizes, we resized the 2D MRI slices of each image to be of size 256×256.

Gaussian normalization. Gaussian normalization was then applied to rescale the voxel intensities to has a zero mean and a unit variance.

Data augmentation. Training set has about 1200 images with corresponding masks. Therefore, data was augmented to 5000 by random rotations , shifts. zooms, flips and elastic deformations.

2. Network architecture

Our network is trained with U-net [1], adding skip connection inspired by [2].

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We built a U-net based on the work of Li [3] and Ronneberger [1].The U-net consists of a down-convolutional part (left side) and up-convolutional part (right side). The left side aims at extracting features for classifying each voxel into one or zero.

3. Implementation Details

The proposed method was implemented in Python language, using Keras with Tensorflow backend. All experiments were conducted on a Linux machine running Ubuntu 16.04 with 32 GB RAM memory. The U-net training was carried out on a single GTX 1080 Ti with 11 GB RAM memory.

References

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