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Deformed non-local neural network for retinal vessel segmentation

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Abstract

Vessel segmentation is a challenging problem in medical image segmentation, as it requires knowing the location of each tiny blood vessel and understanding the global semantic information. Previous method has demonstrated that long-range dependencies information plays an important role in understanding global segmentation information. To capture long-range dependencies information, researchers often use non-local structure. However, it requires too much computing power and a large amount of GPU memory. In this paper, we present a deformed non-local (DNL) neural network structure for retinal vessel segmentation. DNL inherits the structure of the Non-local module, but it changes the operation rules of non-local weight matrix multiplication, which can greatly reduce the problem of excessive computation and memory usage. Meanwhile, we introduce the atrous spatial pyramid pooling module to increase the receptive field of the networks, which showed that it is effective to resample features at different scales for accurately and efficiently classifying regions of an arbitrary scale. The proposed method was evaluated on retinal vessel datasets and experimental results show that it outperforms state-of-the-art methods. For a 128 × 128 input, DNL is around 2.5 times faster than a non-local block on GPU.

Biography:

Junping Zhao has completed his PhD and MD from Medical School of Chinese PLA and Chinese PLA General Hospital. He is the honorary director of Institute of Medical Informatics, Chinese PLA General Hospital; Beijing P.R.China. He has published more than 50 papers in reputed journals and is an expert of medical informatics and ophthalmologist.

Speaker Publications:

1. "Rapid and Controllable Synthesis of Nanocrystallized Nickel-Cobalt Boride Electrode Materials via a Mircoimpinging Stream Reaction for High Performance Supercapacitors. Nano Macro Small. Volume 71, Part B, June 2017, Pages 124-129
2. "Catalytic Asymmetric Assembly of Stereodefined Propionate Units: An Enantioselective Total Synthesis of (—)-Pironetin"; ChemInformVolume 37, Issue 43
3. "Haar wavelets method for solving Poisson equations with jump conditions in irregular. Adv. Comput. Math. 42(4): 995-1012 (2016)

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