Wenshuang Song

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Short Bio

I'm interested in algorithms for visual perception (object recognition, localization, segmentation, pose estimation , ...) especially in the field of scene segmentation. The experience in BUAA VR Lab made me have a great interest and deep understanding of deep learning on Computer Aided Medical. In DeepMotion and CASIA my research domain is scene understanding and environment perception based on deep learning, including object detection based on vision and LiDAR, scene segmentation and other perceptual tasks.

Education

Renmin University of China — Business Management | Bachelor | 2013.09-2017.06

Research

- Real-time scene segmentation
- 3D Point cloud segmentation
- Computer aided medical

Professional Skill

- Have in-depth research on scene understanding and environment perception based on deep learning, including object detection based on vision and LiDAR, scene segmentation and other perception tasks ;
- Perfect in designing the network structure according to the needs of the real scene, and at the same time, can also ensure the algorithm is both scalable and commercializing feasible;
- Familiar with common classification, clustering and regression algorithms of machine learning, familiar with convolutional neural network algorithm and its application process;
- Skillful in the commonly used data structure and algorithm, and can balance time and space efficiency while programming according to actual situation;
- Perfect in Linux and Vim; Familiar with various script languages: C++, Python, Matlab; And skillful at Tensorflow, Pytorch, Caffe and other frameworks.

Project Experience

Real-time Iris Segmentation System — **CASIA | 2019.01-2019.04**

- Objective: Overcome the challenge of various poses, illuminations and occlusions , and make efficient use of scarce resources available on embedded platforms for semantic segmentation;
- Methods: A multi-task cascaded CNNs based framework was proposed for joint face detection and alignment, and we adopts ENet to implement real-time segmentation which requiring low latency.

Different from existing works, we combine attention mechanism and spatial pyramid to extract precise dense features for pixel labeling instead of complicated dilated convolution and artificially designed decoder networks;

- Results: Our proposed approach achieves state-of-the-art performance of average accuracy 94.09%, Mean IOU 93.54%, and average processing time 68.78 FPS;

Scene Segmentation based on 3D point cloud for safe driving DeepMotion | 2017.12-2019.01

- Objective: In order to associating instance and semantic segmentation on point clouds and explore the relationships between the two tasks ;

- Method: We present a powerful framework for 3D instance and semantics segmentation on point clouds, with a Pyramid Attention module for semantic segmentation task and added to instance feature matrix, we designed an effective decoder module Global Attention for instance segmentation and fused with semantics segmentation matrix ;

- Results: Our algorithm can achieve good performance on instance segmentation for various 3D scenes and facilitate the tasks of 3D point clouds segmentation, which can guarantee both scalability and feasibility of commercialization ;

Lung Cancer Detection based on 3D U-net with CT images BUAA VR Lab | 2017.06-2017.12

- Objective: To solve the problem of resolution loss and class imbalance when crop or downsample, and minimal computational overhead while increasing the model sensitivity and prediction accuracy ;

- Method: We described a two-stage U-Net-like framework for two-class segmentation which can directly make prediction for data with original resolution due to its SRCNN-inspired architecture. We adopt a novel attention gate model for CT images that automatically learns to focus on target structures of varying shapes and sizes integrated into standard 3D U-Net model , and trained with a simply weighted dice coecients ;

- Results: The framework we presented consistently improve the prediction performance of state-of-the-art U-Net across different datasets and training sizes while preserving computational efficiency ;

Classification of breast cancer cells and nidus detection based on CNN VR Lab | 2017.01-2017.06

- Objective: Because of the large scale of Whole Slice Images, which poses great challenges for scan whole image manually , and we need a framework to capture global context information ;

- Methods: Different with atrous convolution and ASPP, we adopt Densely connected Atrous Spatial Pyramid Pooling , that fuse a set of atrous convolutional layers densely while generates multi-scale features that cover a larger scale range densely without increasing the model size . In test stage, post-processing is applied to the generated heat-map for further optimization, and OHEM is adopt to false positive excavation, so as to enhance the training set and improve performance;

- Results: Experiments show that our algorithm can achieve classification accuracy 90.75%, which is of great clinical value ;

Competition

- Kaggle image classification algorithm: classify objects in CIFAR10's 10 natural scenes with an accuracy of 94%;

- AI Hackathon: Facial Expression Recognition Challenge,Facial recognition system design with an accuracy of 75%;

- DATAHACH: Developed quantitative trading tools in 24 hours , developing strategies with advanced mathematical models and huge historical data, the most commercial value award;

Research Results

- Software copyright of Real-time Iris Segmentation System under unrestricted conditions 2019.03