Vincent Zhu

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Education

The University of New South Wales, Sydney 03/2021 – 12/2022
Master of Information Technology, Aritificial Intelligence

Northeastern University, China 09/2016 – 07/2020
Bachelor of Science, Computer Science
Courses: *Machine Learning, Data Mining, Deep Learning, Computer Vision, Big Data, Algorithms, Data Structure, etc..*

Job Experience

Zhejiang Ruida Machinery Co., Ltd 04/2021 – 05/2022
Automation Department Developer Intern

- Developed ML/DL-based pipelines using industrial image-based features for assembly line product items detection.
- Designed and conducted studies to investigate the application of defect detection, objection detection, X-ray image augmentation with modern techniques in industry.
- Responsible for rotation industrial object detection project management and implementation.

Northeastern University 07/2018 – 06/2019
Machine Learning Lab Research Assistant

- Worked with multiple clinicians on study design, data collection. Effectively delivered solution and visualization of medical images detection and segmentation.
- Improved the segmentation accuracy by designing a data augmentation using split-Bregman optimization to perform total-variation denoising.
- Participated in literature review and reproduction. Learned a lot about data science and machine learning.

Projects

Image Super Resolution Web App Based on Real-ESRGAN

A web application for image super-resolution based on Real-ESRGAN using flask.

- Optimized CUDA memory allocation for model inference to make it more suitable for low-performance computing platforms.
- Improved input image preprocessing to support single-channel images.
- Developed a web application based on the model using Flask, providing a user-friendly interface for interactive experience.
- Implemented features such as image upload, selection of super-resolution parameters, preview, and download.

Rotate Object Detection Based on YOLOv5 and CSL

Locate the coordinate and rotation angle of assembly line product items and deliver the OONX model.

- Developed a deep learning pipeline with CSPResNet-50 as a backbone to detect objects.
- Performed Mosaic, Mixup and random affine transformation to implemented data augmentation.
- Designed dynamic anchor sampling strategy to improve sampling rate and accelerate network convergence.
- Used Circular Smooth Label(CSL) that discretizes continuous problem of rotation angle to classification problem to implement rotation of recognition boxes.

Research on Cell Detection Based on Computer Vision

Explored the identification, segmentation, tracking, and detection of mitosis for biological cells.

- Designed and tested pre-processing filters and transformations for image augmentation, improved the accuracy by 8% form the baseline model.
- Utilized the segmentation generated by watershed as a pseudo mask to provide sufficient training data.
- Co-worked on detection of mitosis using improved VGG-19. Responsible for testing and analyzing machine learning models for mitosis detection tasks. Final model prediction accuracy achieved 97%.

Medical Image Detection and Segmentation

Detect and segment the livers and lungs from medical images.

- Performed image preprocessing of 1000+ medical images (DICOM) of livers and lungs for AI model training and analyses.
- Developed a weakly-supervised Deep Learning pipeline based on U-net and its variants for medical image segmentation using.

Global Wheat Detection using Faster R-CNN

Detect, locate, and visualize the wheat heads from the images.

- Processed 3000+ image datasets and visualized the labels for training and analyzes.
- Constructed Faster R-CNN training and prediction pipeline with ResNet-152 and EfficientNet-B0 as backbones for wheat heads detection.
- Performed pseudo-labeling, Mixup and affine transformation to implement data augmentation using Albumentation.
- Implemented nested cross-validation and soft-NMS. Prediction achived AU-ROC of 0.77, with a 8% improvement from naive baseline model.

Handwritten Chinese Optical Character Recognition

Implement the recognition of offline handwritten Chinese characters with limited computing resources.

- Developed deep learning OCR pipeline with varied CNN models using TensorFlow2.0 (95% accuracy).
- Improved the recognition accuracy by 11% by applying Gaussian filter, edge enhancement.

Skills

- **Program Language**: Python, C++, C, SQL, R, Scala, Shell, HTML.
- **Frameworks**: Pytorch, TensorFlow, OpenCV, Flask, Spark, hadoop.
- **Platforms and Tools**: Linux, Window, Mac OS, VS Code, Conda, Docker, GitHub, Jira, AWS.