

VINCENT ZHU

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EDUCATION

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- The University of New South Wales, Sydney** 03/2021 – 12/2022
Master of Information Technology, Artificial 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

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- Zhejiang Ruida Machinery Co., Ltd** 04/2021 – 05/2022
Automation Department Developer Intern
- Developed an ML/DL pipeline based on industrial image features using YOLOv5 for object recognition and detection in assembly line.
 - Conducted model optimization experiments to improve model performance by optimizing model structure and training strategies for different scenarios and data.
 - Led a team in exploring and researching the application implementation strategies of Deep Learning in defect detection, object detection, and X-ray image enhancement in the industrial field.
 - Managed and deployed a rotating object detection project, including research, development, and experiments.
- Northeastern University** 07/2018 – 06/2019
Machine Learning Lab Research Assistant
- Collaborated on the research of medical imaging data, effectively processed and maintained case data to ensure completeness and accuracy.
 - Participated in the development of weakly supervised learning-based medical image detection and segmentation solutions, as well as result visualization, optimizing for small-scale datasets using techniques such as Pseudo Mask.
 - Designed and improved data processing workflows to enhance model robustness and accuracy through methods such as image enhancement, data cleaning, and feature extraction.
 - Contributed to literature reviews and replication work, gaining deeper understanding in the field of ML/DL/DS.

PROJECTS

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- Image Super Resolution Web App Based on Real-ESRGAN** Tech: Python, Pytorch, Flask, html, css [🔗](#)
Improved the inference and deployed it on the web, performing a convenient image processing solution.
- Optimized the model inference CUDA memory allocation to make it more suitable for low-performance computing platforms.
 - Improved the preprocessing of input images to support single-channel images.
 - Developed a web application using Flask and HTML based on improved model, providing a user-friendly interface for interactive experience.
 - Implemented features such as image upload, parameter selection, preview, and download.
- Medical Image Detection and Segmentation** Tech: Pytorch, OpenCV, Matplotlib, Pandas, Scikit-learn [🔗](#)
Detect and segment the livers and lungs from medical images.
- Preprocessed and augmented medical image datasets (DICOM) for liver and lung detection and segmentation.
 - Developed a weakly supervised deep learning pipeline based on U-Net for medical image segmentation.
 - Implemented various U-Net and Loss variants to handle diverse data and scenarios.
 - Provided tools for analyzing input images, predicting masks, and visualizing ground truth.
 - Utilizing ResNet-34 as the backbone, employing Focal Loss, Dice optimization, and other methods. Final mean Intersection over Union (mIoU) achieved a 26% improvement compared to the baseline.
- Rotate Object Detection Based on YOLOv5 and CSL** Tech: YOLOv5, Pytorch, OpenCV, Matplotlib
Locate the coordinate and rotation angle of assembly line product items and deliver the OONX model.
- Utilized CSPResNet-50 as the backbone and developed a pipeline based on YOLOv5 for object detection.
 - Used Circular Smooth Label(CSL) that discretizes continuous problem of rotation angle to classification problem to implement rotation of recognition boxes.
 - Designed image collection and annotation processes, improved data input/output, and adapted loss functions.
 - Applied data augmentation techniques such as Mosaic, Mixup, and random affine transformations.
 - Performed Dynamic Anchor Sampling strategy to increase sampling rates and accelerate network convergence.

Research on Cell Detection Based on Computer Vision

Tech: Pytorch, OpenCV, Matplotlib, Pandas
Explored the identification, segmentation, tracking, and detection of mitosis for biological cells.

- Designed and tested pre-processing filters and transformations for image augmentation, achieving an 8% accuracy improvement over the baseline.
- Utilized the segmentation generated by watershed as a pseudo mask to provide sufficient training data.
- Implemented mitosis detection based on an improved VGG-19 model. The final model achieved a prediction accuracy of 97%.
- Visualized cell identification, segmentation, tracking, and mitosis detection.

Global Wheat Detection using Faster R-CNN

Tech: Pytorch, OpenCV, Matplotlib, NumPy, Pandas, Scikit-image
Detect, locate, and visualize the wheat heads from the images.

- Analyzed and processed a dataset of 3000+ images, visualized bounding boxes.
- Built a training and prediction pipeline using ResNet-152 and EfficientNet-B0 as backbone networks for wheat spike detection with Faster R-CNN.
- Implemented data augmentation techniques such as pseudo-labeling, Mixup, and affine transformations using Albumentations.
- Implemented nested cross-validation and soft-NMS. Prediction achieved AU-ROC of 0.77, with a 8% improvement from naive baseline model.

Handwritten Chinese Optical Character Recognition

Tech: Python, Tensorflow, OpenCV, NumPy, Kears
Implemented offline handwritten Chinese character recognition using multiple deep models for training and experimentation.

- Developed a deep learning OCR pipeline based on CNN using TensorFlow (accuracy: 95%).
- Designed different CNN models and data augmentation techniques to improve model performance.
- Improved the recognition accuracy by 11% by applying Gaussian filter, edge enhancement.

SKILLS

- **Program Language:** Python, C++, C, SQL, R, Scala, Shell, Bash, HTML.
- **Frameworks:** Pytorch, TensorFlow, OpenCV, Flask, Scikit-learn, Scikit-image, NumPy, Pandas, Matplotlib, Spark, hadoop.
- **Platforms and Tools:** Linux, Window, Mac OS, VS Code, RStudio, Conda, Jupyter Notebook, Docker, GitHub, Jira, AWS.