

# Zhaoxu Zheng

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## Introduction

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I am currently a third-year student at Harbin University of Science and Technology, majoring in Computer Science and Technology within the CSE Department. I am about to participate in the **UCSD 2025 Spring Extension Program** to further broaden my academic and research experience.

My current research interest lies in the application of **Computer Vision (CV) in the medical field**. I am particularly passionate about exploring how CV can be leveraged to enhance medical imaging analysis and improve diagnostic accuracy. After completing my undergraduate studies, I plan to **pursue a master's degree**, further deepening my expertise in the field of **Computer Vision** and its interdisciplinary applications.

## Research Interests

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- Machine Learning
- Computer Vision
- Image Segmentation
- Deep Learning

## Education

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**Harbin University of Science and Technology**, Third-year Student in Computer Science, CSE Department

Sept 2022-Jan 2025

- GPA: 3.84/4.0 4.23/5.00 rank 2/285

## Projects

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### Lung Nodule Detection using Machine Learning

2024-present

- First, I performed preprocessing on the input CT images, including **format conversion** and **data augmentation**. Then, I applied the **U-Net** architecture for segmentation. However, to address the issue of false positives generated by the initial segmentation, I incorporated a **3D-CNN** to refine the results and eliminate false positives. As a result, the final output consisted of suspected lung cancer regions with improved accuracy. Building upon this approach, I enhanced the model by integrating **U-Net++** with 3D-CNN, which outperformed the traditional U-Net + 3D-CNN combination in terms of detection accuracy. The improved framework demonstrated superior segmentation performance, making it a more effective solution for lung nodule detection.
- Tools Used: Python, Linux

### Facial Recognition Project Using Template Matching

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- Facial recognition is another project I worked on, where I specifically employed **template matching** as the core technique. In this project, I used **frontal-face photos of my classmates** as the input dataset. This served as a practical implementation of **digital image processing**. First, I designed a program to **batch process** the images, including converting them to **grayscale** and resizing them to **252×256 pixels** to facilitate recognition and matching. For facial feature detection, I utilized the **template matching method**, where a **standard left eye** and a **standard right eye** served as predefined templates. These templates were systematically **slid across the target image** to detect the **eye regions** based on similarity matching. After locating the eyes, I applied the **Hough Transform** to **detect the pupil positions**, further refining facial alignment. Based on the **line connecting the pupils**, the image was **rotated** to ensure horizontal orientation. Finally, the face region was **cropped to a standardized size**, completing the preprocessing for facial recognition.
- Tools Used: Matlab