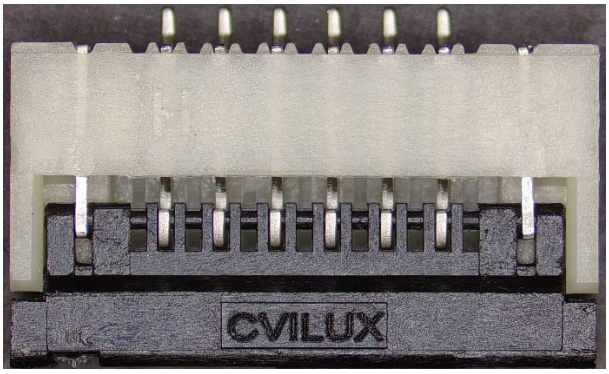
AI 2024, Assignment 4:

U-Net

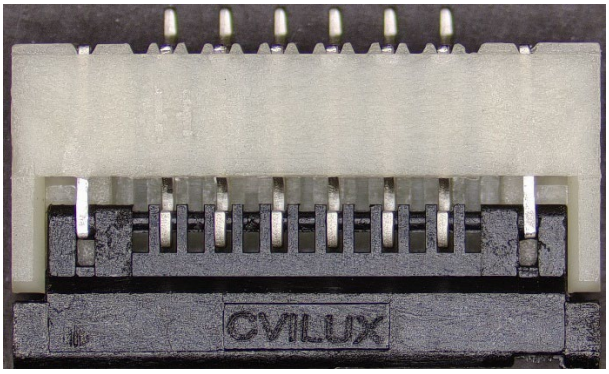
In this assignment, you will use U-Net, a popular convolutional neural network architecture, to segment and isolate the pin regions in images of connectors. The connector images are in RGB format with a resolution of 1574x952 pixels.

Connector

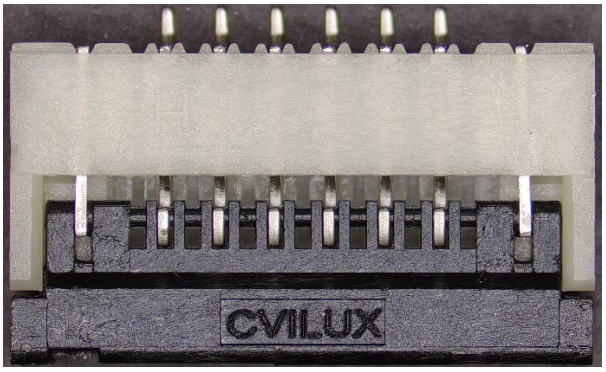
https://github.com/FansFamily429/AI-class/tree/main/U-Net/Dataset

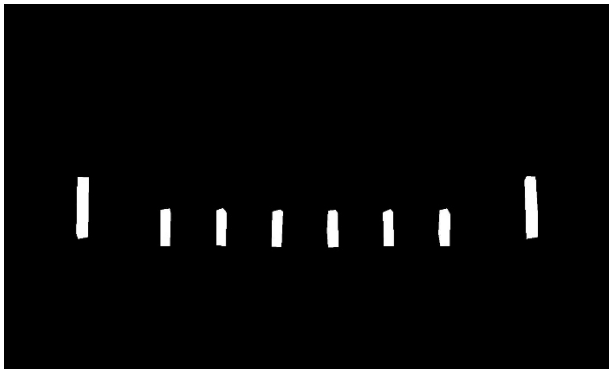


Image



Mask





Task Requirements:

1. Model Design: Implement U-Net using TensorFlow or PyTorch to accurately segment the pin areas in the connector images.
2. Data Preprocessing: Load and preprocess the connector images, ensuring they are properly resized and normalized.
3. Training: Train the U-Net model on the dataset, adjusting hyperparameters such as learning rate and batch size.
4. Evaluation: Evaluate the model's performance using metrics such as Intersection over Union (IoU).
5. Visualization: Visualize the segmented pins and overlay them on the original images.

Deliverables:

1. Code Implementation: Submit your U-Net model code with proper documentation.
2. Report: Provide a report explaining the model performance, training process, and segmentation results.
3. Visualizations: Include segmented images showing the accuracy of pin segmentation.