Meeting Recap

Date & Time:

3 April 2025 2PM

Attendees:

- Yoo, Y

- Noah GOSCINIAK

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1. Executive Summary

Yoo, Young Joon shared expert insights on modern computer vision segmentation techniques. Key recommendations included U-Net variants and Fully Convolutional Network (FCN) deep learning models to address our image segmentation needs.

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2. Discussion Points

Computer Vision Segmentation Overview

- Importance of precise pixel-level classification for our use cases (e.g., medical imagery, scene understanding).

U-Net Family of Models

- **Architecture:** Encoder–decoder with skip connections for fine-grained feature recovery.
- **Variants:**

  - U-Net++ (nested U-Net) for richer multi-scale feature fusion.

  - Attention U-Net to focus on relevant spatial regions.

- **Pros & Cons:**

  - Excellent performance with limited data.

  - – Higher memory footprint; may require patch-based training.

Fully Convolutional Networks (FCNs)

- **Core Idea:** Replace fully connected layers with convolutional layers for end-to-end segmentation.
- **Notable Models:**
    - FCN-8s for coarse-to-fine upsampling.
    - DeepLab (atrous convolutions + CRF) for sharper boundaries.
- **Pros & Cons:**
    - - Simpler architecture & faster inference.
    - – Can struggle with small object segmentation without additional post-processing.

Model Selection Criteria

- **Data Volume & Annotation Quality**
- **Compute Resources & Inference Latency**
- **Target Application Requirements** (e.g., boundary precision vs. speed)

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3. Decision

Evaluate and prototype both a U-Net variant and an FCN-based model on our dataset to compare accuracy, speed, and resource utilization.

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4. Next Steps & Action Items

Set up data pipeline and preprocess images for segmentation tasks
Implement baseline U-Net and run initial training/validation
Implement baseline FCN-8s (and DeepLab if resources allow)
Compare metrics (IoU, pixel accuracy, inference time)
Review results with Yoo, Young Joon and refine model selection