

SUMMARY

I am an accomplished AI Researcher and Engineer with over six years of specialized experience in computer vision (CV) and natural language processing (NLP). Throughout my career, I have demonstrated a strong commitment to advancing the field of artificial intelligence by developing innovative solutions that address complex, real-world challenges. My expertise encompasses the end-to-end design, implementation, and deployment of cutting-edge AI systems, consistently driving operational excellence and delivering measurable impact across diverse industry sectors. I am passionate about harnessing emerging technologies to push the boundaries of what is possible and to create meaningful value for organizations and society. My research work and real-world projects can be explored in more detail in my Google Scholar profile and online portfolio.

SKILLS

- **Programming Languages:** Highly proficient in Python; foundational knowledge of Java.
- **Deep Learning Frameworks:** Extensive experience with PyTorch, PyTorch Lightning, Hugging Face Transformers; proficient in TensorFlow, Keras, and NumPy.
- **Deep Learning Techniques:** Expertise in model architecture design (CNNs, RNNs, LSTMs, Transformers, GANs, Vision Transformers), transfer learning, self-supervised learning, and model optimization.
- **Model Development & Deployment:** Skilled in end-to-end pipeline development, model training and evaluation, hyperparameter tuning, distributed training, quantization, pruning, and ONNX model export.
- **Machine Learning Libraries:** Expert in scikit-learn, OpenCV (cv2), pandas, and SciPy.
- **Experiment Management:** Proficient in experiment tracking and model management using tools such as MLflow, Weights & Biases, and TensorBoard.
- **Cloud & Server Technologies:** Proficient in Docker, API development (Streamlit, Gradio, FastAPI), and version control systems (Git). Experience with cloud platforms (AWS, GCP, Azure) for scalable model deployment.
- **Soft Skills:** Excellent communication and teamwork abilities; adept at performing effectively under pressure.

EDUCATION

Kyungpook National University
PhD in Computer Science and Engineering

Daegu, South Korea
GPA - 4.5/4.5

EXPERIENCE

- **Senior AI Engineer and Researcher**
AI Team Lead

Rinorbit, South Korea
October 1, 2024 - Present

 - **Computer Vision:**
 - * Lead the end-to-end software development of an AI-powered cervical cancer detection device, contributing to Rinorbit's vision of becoming a global top-tier digital pathology technology enterprise.
 - * Architected and implemented advanced deep learning models for early detection and precise classification of cervical cancer cells, leveraging state-of-the-art training strategies and high-level model design.
 - * Integrated the latest semantic segmentation techniques, including SAM2.1, to achieve highly accurate and robust cell segmentation, significantly enhancing diagnostic precision.

- * Applied cutting-edge object detection frameworks such as YOLOX, YOLOv11, GroundingDINO, and DFLNet to enable high-accuracy cell detection and classification in complex medical imagery.
- * Optimized real-time inference pipelines, reducing computational latency and ensuring efficient deployment in clinical environments.
- * Converted and deployed trained models to ONNX format, utilizing TensorRT and C++ for high-performance inference on medical imaging hardware.
- * Developed robust APIs to enable seamless communication between application front-end and back-end, supporting smooth integration with digital pathology workflows.
- * Employed advanced generative adversarial networks (GANs) for synthetic image generation, standardizing image characteristics (color, texture) across devices and improving model generalizability.
- * Collaborated closely with hardware engineers and clinical partners to ensure reliable integration of AI software with medical imaging devices.
- * Oversaw code quality, documentation, and team collaboration, fostering a culture of innovation and technical excellence within the AI team.

• Senior AI Engineer and Researcher

Vitasoft, South Korea

Computer Vision Part Team Lead

October 2022 – September 2024

◦ Computer Vision:

- * Led and successfully delivered 5+ large-scale, long-term computer vision projects, overseeing all phases from conception to deployment.
- * Executed over 400 short-term mini-projects utilizing Kaggle open-source databases, rapidly prototyping and validating computer vision solutions.
- * Specialized in image retrieval, image generation, semantic segmentation, object detection, and crowd counting, applying state-of-the-art deep learning techniques.
- * Engineered robust APIs to facilitate seamless integration between front-end and back-end components, ensuring efficient data flow and system interoperability.
- * Orchestrated cloud-based deployments on AWS, leveraging Docker for containerization to streamline deployment, ensure consistency, and enhance scalability across diverse environments.
- * Implemented parallelized deep learning training pipelines using PyTorch Lightning, significantly improving computational efficiency and model performance.

◦ Natural Language Processing:

- * Led the development and deployment of deep learning models for text-driven applications, including retrieval-augmented generation and optical character recognition (OCR) projects.
- * Executed on-premise NLP solutions utilizing Hugging Face and Transformer libraries, ensuring data privacy and compliance with client requirements.
- * Collaborated closely with project managers and cross-functional teams to ensure timely delivery and alignment with project milestones.
- * Developed and maintained APIs for NLP services, optimizing communication between system components and enhancing user experience.
- * Applied Docker-based containerization for NLP applications, streamlining deployment processes and enabling robust, scalable solutions.

• Graduate School Researcher

Kyungpook National University, South Korea

Multimedia Processing Information Lab, AI Lead

July 2019 – September 2022

◦ Computer Vision:

- * Led and successfully executed over 5 long-term research projects in computer vision, including industrial collaborations focused on automated visual inspection, anomaly detection, and medical image segmentation.
- * Specialized in image classification, semantic segmentation, object detection, and image generation, applying state-of-the-art deep learning techniques to real-world challenges in industry and healthcare.
- * Published more than 10 scientific papers in leading SCIE journals, contributing novel methodologies and advancing the state of the art in computer vision and deep learning.
- * Supervised and mentored undergraduate students in deep learning coding practices (TensorFlow, PyTorch), scientific writing, and research presentation, fostering the next generation of AI researchers.
- * Collaborated with industrial partners to integrate AI-driven computer vision solutions into production processes, significantly enhancing efficiency and technological innovation.

- **Natural Language Processing:**

- * Led sequence data-driven projects, including text classification and sentiment analysis, utilizing advanced NLP frameworks such as PyTorch, Transformers, and Hugging Face.
- * Designed and implemented deep learning models for text-based applications, ensuring robust performance and scalability.
- * Provided instruction and mentorship to undergraduate students in NLP-related coding and research, supporting their academic and professional development.
- * Coordinated with project managers to ensure timely delivery of research milestones and successful completion of AI projects.

PROJECTS & RESEARCH

- **AI-Powered Cervical Cancer Detection System (Ongoing):**

- Leading the development of an AI-driven cervical cancer detection system at Rinorbit, aiming to enhance diagnostic accuracy and efficiency in digital pathology.
- Architecting state-of-the-art models for cell segmentation (SAM2.1) and detection (YOLOX, YOLOv11, GroundingDINO, DFine), achieving high precision in identifying abnormal cells.
- Optimizing inference pipelines for real-time performance, significantly reducing latency through model quantization and TensorRT deployment in C++.
- Integrating AI solutions with medical imaging hardware, ensuring seamless operation in clinical environments.
- Implementing GAN-based image synthesis to standardize color and texture across diverse imaging devices, improving model generalizability.
- Developing user-friendly APIs (Streamlit, Gradio) and Dockerized deployment pipelines for scalable integration into healthcare workflows.

Experience: Python, PyTorch, SAM, YOLO, GroundingDINO, DFine, ONNX, TensorRT, C++, GANs, Docker, Medical Imaging

- **Manga2Webtoon Using AI:**

- Developed an AI-driven pipeline to convert Japanese and Chinese manga into Korean webtoons. The workflow included semantic segmentation, image colorization of grayscale images, and text extraction from speech bubbles using OCR, demonstrating a comprehensive approach to multi-modal content transformation.

Experience: Python, PyTorch, Semantic Segmentation, Object Detection, OCR, Image Colorization

- **Mini Projects Using Open-source Databases:**

- Successfully completed over 200 mini-projects utilizing Kaggle open-source datasets, encompassing a wide range of deep learning tasks such as image classification, object detection, semantic segmentation, natural language processing, and multi-modal training.

Experience: Python, PyTorch, Jupyter Notebook, Triplet Loss, Deep Learning

- **Recommendation System for "GPARTS" Online Marketplace:**

- Developed a recommendation engine for automotive used parts, leveraging real-world images to suggest part serial numbers uploaded by users, thereby enhancing the GPARTS online marketplace experience.

Experience: Python, PyTorch, Image Retrieval, PyTorch Lightning, Triplet Data, Contrastive Learning

- **Triplet Data-based Contrastive Loss Image Retrieval:**

- Designed and implemented a model for retrieving real-life images based on sketches, deployed for counterfeit luxury goods detection at the Korea Customs Service. Utilized triplet loss and contrastive learning for robust cross-domain retrieval.

Experience: Python, PyTorch, Image Retrieval, PyTorch Lightning, Triplet Data, Contrastive Learning

- **Real and Synthetic Korean License Plate Generator:**

- Conducted research on generating both synthetic and real image datasets of South Korean vehicle registration plates. The resulting dataset was used to train an AI model for a license plate recognition and parking management system.

Experience: Python, PyTorch, Image Generation, GAN, License Plate Generation

- **Crowd Counting for Public Safety:**

- Developed a deep learning solution to identify densely populated areas and proactively alert law enforcement to potential crowd-related hazards, inspired by the Seoul Halloween crowd incident in October 2022.

Experience: Python, PyTorch, Object Detection, Model Architecture, YOLO, Bounding Box

- **Disabled Individual Signs Detection in Vehicles:**

- Supervised undergraduate research on detecting disabled individual signs in vehicles, guiding the team through data collection, model development, scientific writing, and conference presentation.

Experience: Python, PyTorch, Object Detection, Model Architecture, YOLO, Bounding Box

- **Anomaly Detection in Manufacturing Project:**

- Proposed UzADL, an unsupervised, computationally efficient, and interpretable model for automated visual inspection in manufacturing. The approach includes pseudo-labeling, targeted training, and explicit visualization of defective regions for anomaly interpretation.

Experience: Python, PyTorch, Anomaly Detection, Model Architecture, Defective Area Heatmap

- **Autonomous Vehicle Operation Semantic Segmentation Project:**

- Developed the Robust, Efficient, and Fast Network (REF-Net) for semantic segmentation in autonomous driving. The model integrates dilated and asymmetric convolution layers, skip connections, and bottleneck layers in the encoder, and employs parameter-free nearest neighbor interpolation for efficient decoding.

Experience: PyTorch, Efficient Computation, Autonomous Driving, Model Architecture, Semantic Segmentation

- **Biomedical Semantic Segmentation Project:**

- Enhanced the U-Net model for biomedical image segmentation by developing the Fast U-Net (FU-Net), incorporating bottleneck convolution layers in both contraction and expansion paths to improve computational efficiency and segmentation accuracy.

Experience: TensorFlow, Keras, Efficient Computation, Model Architecture, Semantic Segmentation

- **Weight Initialization-based Rectified Linear Unit:**

- Conducted research into the mathematical foundations of various weight initialization strategies to determine the most effective approach for deep neural networks. Emphasized achieving standard normal activation distributions (mean 0, standard deviation 1) in each CNN layer for optimal training stability and performance.

Experience: Python, PyTorch, Activation Function, Image Classification

INFO & LANGUAGES

Gender
Age, DOB
Nationality
English
Korean
Uzbek
Russian

Male
 33 years, 1992/04/06
 Uzbekistan
 TOEIC (985); IELTS (8.0)
 TOPIK (Level 6); KIIP (Level 5)
 Native
 Bilingual proficiency