Junhyuk Heo

✉ E-mail   ○ Github   in LinkedIn   ☎ Google Scholar   ○ Homepage

Introduction

I'm an AI researcher in TelePIX ↗. My research seeks to solve real-world problems from an artificial intelligence perspective. I address challenging tasks such as complex image restoration and data-efficient learning for few-shot segmentation by applying generative models (diffusion-based, score-based, translation models). In parallel, my work explores continuous signal modeling using Implicit Neural Representations (INRs) for applications in neural image compression and spatial-spectral super-resolution. Recently, my research interest has shifted towards Vision-Language Models (VLMs). My primary goal is to build a unified model capable of solving various complex tasks in earth science.

Education

Konkuk University   *Mar 2018 – Feb 2024*
Major in Civil Engineering   *Seoul, Republic of Korea*
Minor in Computer Science

Publications

Fourier-Modulated Implicit Neural Representation for Multispectral Satellite Image Compression   *IGARSS (Oral), 2025*

Woojin Cho*, Steve Andreas Immanuel*, *Junhyuk Heo*, and Darongsae Kwon
Paper ↗ Code ↗ Poster ↗

Tackling Few-Shot Segmentation in Remote Sensing via Inpainting Diffusion Model   *ICLRw (Best Paper Award), 2025*

Steve Andreas Immanuel, Woojin Cho, *Junhyuk Heo*, and Darongsae Kwon
Paper ↗ Code ↗ Poster ↗

SAR-to-optical image translation with UNSB-FFC considering shadow area pixels   *KSCE Journal of Civil Engineering, 2025*

Su Min Jo, *Junhyuk Heo*, and Yang Dam Eo
Paper ↗

Neural Compression for Multispectral Satellite Images   *NeurIPSw, 2024*

Woojin Cho*, Steve Andreas Immanuel*, *Junhyuk Heo*, and Darongsae Kwon
Paper ↗ Code ↗ Poster ↗

Research Experiences

TelePIX ↗   *May 2024 – Present*
AI Researcher   *Republic of Korea*
  ○ Satellite image enhancement (denoising, pansharpening, super-resolution)
  ○ Image segmentation and few-shot learning for satellite analysis (environmental & industrial monitoring)
  ○ Satellite image compression using modulated INR
  ○ Satellite image corrections(radiometric correction, atmospheric correction, geometric correction, orthorectification)

Geomatics Lab ↗   *Jun 2023 – Feb 2024*
Research Intern   *Konkuk Univ., Republic of Korea*
  ○ Satellite image analysis using QGIS, ArcGIS
  ○ SAR(Synthetic Aperture Radar) to Optical image translation using generative models

Projects

SAR despeckling (1st author) ↗   *Mar 2025 – Jun 2025*
ICML 2025 workshop(rejected) ↗
  ○ A self-supervised, score-based framework for SAR despeckling using a novel noise normalization pipeline
  ○ Utilizes a Log-Yeo-Johnson transformation to normalize multiplicative Gamma speckle into an approximately Gaussian distribution.
  ○ Employs a Corruption2Self-inspired objective, enabling training solely on noisy SAR images without clean ground truth.
  ○ Delivers superior speckle reduction while maintaining fast inference times comparable to traditional algorithms.

Hyperspectral Images Pansharpening (1st author) ↗   *Dec 2024 – Jan 2025*
ESA-NASA Workshop on AI Foundation Model for Earth Observation ↗
  ○ Proposal for a PAN-conditioned INR enabling continuous, resolution-independent pansharpening.
  ○ Aims to mitigate color distortion on real data by overcoming the resolution gap inherent in supervised models.
  ○ Designed for fast inference with a single forward pass, in contrast to slow per-image optimization methods.

- Accepted for presentation at the ESA-NASA International Workshop on AI Foundation Models for Earth Observation.

Deep Learning Projects ↗   *Jul 2022 – Jan 2024*
deep daiv. ↗
- Deployment of a Golf Swing Analysis Web Service with YOLO-Based 3D Pose Estimation
- Novel Model Development and Web Pipeline for Change Detection
- Text-Based Meme Recommendation and Face Synthesis Web Service
- Object-to-Hanjii Stylization via Image-to-Image Generation

Research Interests

Generative Model: Diffusion Based Model, Score Based Model

Implicit Neural Network: Coordinate Based INR, Local Implicit Image Function, Physics Infromed Neural Network

Vision Language Models: Referring Segmentation, Visual Question Answering, Visual Resoning, Large Vision Language Models

Training Strategy: Self-Supervised Learning, Representation Learning, Few-shot Learning, Meta Learning

Skills

Programming Languages: Python, C/C++, Javascript, MATLAB

Deep Learning: PyTorch, TensorFlow, Keras, DDP

Remote Sensing: ArcGIS, QGIS, Google Earth Engine

Tools & Platforms: Git, Docker, Linux, AWS, Latex

Language: Korean(native), English