TEERAPONG PANBOONYUEN, PH.D.

MARS - **M**otor **A**I **R**ecognition **S**olution, 86/1 Thai Virawat Building (15th Floor), Klongsan, BKK 10600

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RESEARCH INTERESTS

- AI, Machine learning (including Data Science), Deep learning: Computer Vision and Pattern Recognition
- **Tech Toolkit:** Python; PyTorch; AWS; GCP; GPT; HuggingFace; GenerativeAI; Kubernetes; API

EDUCATION

Postdoctoral Visiting Scholar in AI for Understanding Satellite Imagery *2022 - Present*
Chulalongkorn University
Research Topic: Land Use and Land Cover (LULC) Using Sequence-to-Sequence Perspective with Transformers
Published a research paper in a Tier 1/Q1 journal

Postdoctoral Researcher in AI *2021 - 2022*
Chulalongkorn University
Research Topic: Semantic Labeling in Remote Sensing Corpora Using Convolutional Neural Network
Published a research paper in a Tier 1/Q1 journal

Ph.D. in Computer Engineering *2017 - 2020*
Chulalongkorn University (GPAX: 4.00/4.00)
Dissertation Title: Semantic Segmentation on Remotely Sensed Images Using Deep Convolutional Encoder-Decoder Neural Network (Evaluation: Very Good)

M.Eng. in Computer Engineering *2015 - 2016*
Chulalongkorn University (GPAX: 4.00/4.00)
Thesis Title: Semantic Road Segmentation on Remotely-Sensed Images Using Deep Convolutional Neural Networks and Landscape Metrics (Evaluation: Very Good)

B.Eng. in Computer Engineering *2012 - 2015*
KMUTNB (GPAX: 3.11/4.00)
Thesis Title: Lumbar Spinal Canal Stenosis Classification (Evaluation: Grade A)

PROFESSIONAL EXPERIENCE

AI/ML Team Lead (Senior) — Motor AI Recognition Solution (MARS) *Jan 2022 - Present*

- Developed an AI model called **MARS**: **M**ask **A**ttention **R**efinement with **S**equential Quadtree Nodes for the MARS company. The project was presented at the International Conference on Image Analysis and Processing, ICIAP 2023, held in Udine, Italy, from September 11-15, 2023, and published in the conference proceedings.

- New research starts with understanding, AI-model creating (in the tasks: Image Classification, Object Detection, Instance Segmentation, Domain Adaptation, Explainable AI (XAI), Interpretable AI, or Explainable Machine Learning (XML), etc.), reproducing, and verifying ai results in the auto insurance industry.

- Provides API to the service team (frontend and backend) to download and use our pre-trained models on car insurance and garage tasks, then transferred to production.

- Novel research (in the databases: CVPR, ICLR, ICCV, ECCV, NeurIPS, PAMI, etc.) involves inventing new models that will likely break the design assumptions of existing models.

- Spearhead the creation and refinement of cutting-edge deep learning architectures, leveraging your expertise to develop next-generation models that surpass current benchmarks.

- Drive the exploration and implementation of novel AI algorithms, pushing the boundaries of deep learning to solve complex challenges and optimize performance across diverse domains.

- Architect and deploy state-of-the-art deep learning solutions for autonomous systems, contributing significantly to the evolution of self-driving cars, drones, or robotics.

- Develop groundbreaking Machine Vision and NLP frameworks using deep learning methodologies, transforming language understanding and generation capabilities to empower innovative applications.

Visiting Faculty - College of Computing, Khon Kaen University *June 2023 - Present*

- Teach undergraduate and postgraduate students the course: **SC320002 Business Intelligence**, **CP020001 Introduction to Computers and Programming**, and **SC310005 Artificial Intelligence and Machine Learning Application** delivering engaging and informative lectures.

- Develop and update course materials, including syllabi, assignments, and assessments, to ensure students receive a comprehensive education in Business Intelligence.

- Deliver high-quality instruction in the **AI and Machine Learning** course to undergraduate and graduate students, promoting a deep understanding of the subject matter.

- Instruct the **Big Data** course for undergraduate and postgraduate students, providing comprehensive and up-to-date education in the field.

- Ministerial Order on the Appointment of Academic Staff **(Order 5907-2566 Khon Kaen University)**

Dept. of Survey Engineering — Chulalongkorn University *July 2022 - Present*

- My postdoc research focused on designing and providing an alternative perspective by treating LULC as a sequence-to-sequence prediction task on remote sensing corpora.

- Advisor: Chalermchon Satirapod and Chaiyut Charoenphon

AI Research Scientist (Department Manager) — CJ Express and TILDI *Nov 2020 - Aug 2021*

- Apply Data Science and AI technology (PySpark, Deep Learning) in Barter for Demand Forecasting in Retail Grocery Stores.

- Working as Artificial Intelligence Researcher with Machine Learning, Big Data Solutions; Hadoop, PySpark for Demand Forecasting Project via Data Innovation Team.

- Fine-Grained Time Series Forecasting at Scale with PySpark, Deep Learning, and Visualizing Demand Seasonality.

Dept. of Computer Engineering — Chulalongkorn University *Sep 2015 - Apr 2022*
Postdoctoral Researcher, Ph.D./M.Eng. Candidate
My research focused on designing and building deep encoder-decoder networks for semantic segmentation on satellite images. My academic interests mainly lie at the intersection of Remote Sensing, Computer Vision, and Machine Learning, and I work at the Machine Intelligence and Knowledge Discovery Lab (MIND Lab).

- My PostDoc Research (Full Paper, 2021): https://www.mdpi.com/2072-4292/13/24/5100

- My Publication Dissertation (Full Text, 2020): http://cuir.car.chula.ac.th/handle/123456789/70297

- My Publication Thesis (Full Text, 2016): http://cuir.car.chula.ac.th/handle/123456789/55593

- Advisor: Peerapon Vateekul, Siam Lawawirojwong, Kulsawasd Jitkajornwanich, and Panu Srestasathiern

Graduate Teaching Assistant — Chulalongkorn University *Sep 2015 - Apr 2022*
Co-instructed the annual offering on machine learning to undergraduate/graduate students.
Revised the course content to include hands-on experience with Python programming.

- 2140101 Computer Programming (Java, ISE, Chulalongkorn University)

- 2110101 Computer Programming (Python, 1st year bachelor of Faculty of Engineering)

- 2110627 Big Data Tools (Master Student)

- 2110446 Data Science and Data Engineering (3rd-year bachelor of Computer Engineering)

- (Online Course, Head TA) Intro to Data Analytics and Big Data (https://mooc.chula.ac.th)

- (Online Course, Head TA) Practical Data Analytics Using Rapid Miner (https://mooc.chula.ac.th)

Artificial Engineer (Freelance) — GISTDA *Mar 2016 - Dec 2020*

- AI research in the laboratory of Siam Lawawirojwong and Panu Srestasathiern

- 1st Project: Automated land-use/land-cover classification (LULC) Map Production using Deep Learning

- 2nd Project: A Multi-class Deep Learning Approach for LULC Classification of LANDSAT-8 Satellite Images

- 3rd Project: Deep Learning Based Forest Fire Classification in LANDSAT-8 Satellite Images

Data Technical Support (Freelance) — Bank of Thailand   *Mar 2020*

Writing python script to download for various data sources: Sentinel-2 L1C, Sentinel-2 L2A, Sentinel-1, Landsat 8, etc.

Create radiometrically terrain correct (RTC) on sentinel-1 data using python

Data Science (Freelance) — Centaco Farm Company Limited   *2019 - 2020*

Implement and design a hatchability prediction model of broiler chickens by using a regression model

Problem solving for a quadratic relationship between the predicted hatchability and the age of the breeders

Research Assistant (Freelance) — Digital Economy Promotion Agency   *2019 - 2020*

Creating the AI model and computer vision technique to segment multi-objects on aerial and satellite image

Pathway Assistant (Part-time) — Bangkok Innovation House   *Dec 2018 - Jan 2020*

Data science pathway team of Chula Mooc achieve with Volunteer Teaching (Practical Data Analytics)

- Metropolitan Electricity Authority (MEA) and Metropolitan

Computer Technical Support — Main Shipping Service   *2017 - 2020*

Design and deploy functional networks (WAN, LAN, WLAN), including configure and install software, servers, routers and other network devices. Maintain complete technical documentation and suggest network performance, capacity and scalability improvements.

AWARDS AND HONORS

- **H.M. the King Bhumibhol Adulyadej**'s 72nd Birthday Anniversary Scholarship (Master)

- The 100th Anniversary Chulalongkorn University Fund for Doctoral Scholarship (Ph.D.)

- The 90th Anniversary of Chulalongkorn University Scholarship (Ph.D.)

- Ratchadapisek Somphot Fund for 2021 Postdoctoral Fellowship, Chulalongkorn University (PostDoc)

- Ratchadapisek Somphot Fund for 2022 Postdoctoral Fellowship, Chulalongkorn University (PostDoc)

- Ratchadapisek Somphot Fund for 2023 Postdoctoral Fellowship, Chulalongkorn University (PostDoc)

- **Best Student Paper Award** in International Conference on Computing and Information Technology 2017

- Reviewer for International Journals/Conferences (ISI, Scopus, DBLP, etc.)

REFEREED PUBLICATIONS

1. **Panboonyuen, Teerapong**, et al. MeViT: A Medium-Resolution Vision Transformer for Semantic Segmentation on Landsat Satellite Imagery for Agriculture in Thailand. Remote Sensing 15.21 (2023): 5124.

2. **Panboonyuen, Teerapong**, et al. MARS: Mask Attention Refinement with Sequential Quadtree Nodes for Car Damage Instance Segmentation. International Conference on Image Analysis and Processing. Cham: Springer Nature Switzerland, 2023.

3. **Panboonyuen, Teerapong**, et al. Object Detection of Road Assets Using Transformer-Based YOLOX with Feature Pyramid Decoder on Thai Highway Panorama. Information 13.1 (2022): 5.

4. **Panboonyuen, Teerapong**, et al. Transformer-Based Decoder Designs for Semantic Segmentation on Remotely Sensed Images. Remote Sensing 13.24 (2021): 5100.

5. **Panboonyuen, Teerapong**, et al. Semantic Labeling in Remote Sensing Corpora Using Feature Fusion-Based Enhanced Global Convolutional Network with High-Resolution Representations and Depthwise Atrous Convolution. Remote Sensing 12.8 (2020): 1233.

6. **Panboonyuen, Teerapong**, et al. Semantic Segmentation on Remotely Sensed Images Using an Enhanced Global Convolutional Network with Channel Attention and Domain Specific Transfer Learning. Remote Sensing 11.1 (2019): 83.

7. **Panboonyuen, Teerapong**, et al. Road segmentation of remotely-sensed images using deep convolutional neural networks with landscape metrics and conditional random fields. Remote Sensing 9.7 (2017): 680.

8. **Panboonyuen, Teerapong**, et al. An enhanced deep convolutional encoder-decoder network for road segmentation on aerial imagery. International Conference on Computing and Information Technology. Springer, Cham, 2017.

9. **Panboonyuen, Teerapong**, et al. Image Vectorization of Road Satellite Data Sets, Journal of Remote Sensing and GIS Association of Thailand (2017)

10. Wichakam, I., **Panboonyuen, T.**, Udomcharoenchaikit, C., and Vateekul, P. (2018, February). Real-Time Polyps Segmentation for Colonoscopy Video Frames Using Compressed Fully Convolutional Network. In International Conference on Multimedia Modeling (pp. 393-404). Springer, Cham.

11. Vajeethaveesin, T., **Panboonyuen, T.**, Lawawironjwong, S., Srestasathiern, P., Jaiyen, S., & Jitkajornwanich, K. (2022). A Performance Comparison between GIS-based and Neuron Network Methods for Flood Susceptibility Assessment in Ayutthaya Province. Trends in Sciences, 19(2), 2038-2038.

12. Jitkajornwanich, K., Vateekul, P., **Panboonyuen, T.**, Lawawirojwong, S., and Srisonphan, S. (2017, December). Road map extraction from satellite imagery using connected component analysis and landscape metrics. In 2017 IEEE International Conference on Big Data (Big Data) (pp. 3435-3442). IEEE.

13. Chantharaj, S., Pornratthanapong, K., Chitsinpchayakun, P., **Panboonyuen, T.**, Vateekul, P., Lawavirojwong, S., ... & Jitkajornwanich, K. (2018, July). Semantic Segmentation On Medium-Resolution Satellite Images Using Deep Convolutional Networks With Remote Sensing Derived Indices. In 2018, the, the 15th International Joint Conference on Computer Science and Software Engineering (JCSSE) (pp. 1-6). IEEE.

14. Kantavat, P., Hayashi, Y., City, G. S., Kijsirikul, B., **Panboonyuen, T.**, Achariyaviriya, W., ... & Vateekul, P. Transportation Mobility Factor Extraction Using Image Recognition Techniques, First International Conference on Smart Technology & Urban Development (STUD 2019).

15. Intarat, K.; Rakwatin, P.; **Panboonyuen, T**. Enhanced Feature Pyramid Vision Transformer for Semantic Segmentation on Thailand Landsat-8 Corpus. Information 2022, 13, 259.

16. Thitisiriwech, K., **Panboonyuen, T.**, Kantavat, P., Iwahori, Y. and Kijsirikul, B., 2022. The Bangkok Urbanscapes Dataset for Semantic Urban Scene Understanding Using Enhanced Encoder-Decoder with Atrous Depthwise Separable A1 Convolutional Neural Networks. IEEE Access.

17. Thitisiriwech, K., **Panboonyuen, T.**, Kantavat, P., Kijsirikul, B., Iwahori, Y., Fukui, S., & Hayashi, Y. (2023). Quality of Life Prediction in Driving Scenes on Thailand Roads Using Information Extraction from Deep Convolutional Neural Networks. Sustainability, 15(3), 2847.

PROFESSIONAL SERVICE

- Invited Reviewer of **Pattern Recognition** (Elsevier) (Q1, ISI Journal)
- Invited Reviewer of **Neurocomputing** (Elsevier) (Q1, ISI Journal)
- Invited Reviewer of **Computer Vision and Image Understanding** (Elsevier) (Q1, ISI Journal)
- Invited Reviewer of **Computers and Geosciences** (Elsevier) (Q1, ISI Journal)
- Invited Reviewer of **PLOS ONE** (Q1, Public Library of Science, ISI Journal)
- Invited Reviewer of **Scientific Reports** (Q1, Nature)
- Invited Reviewer of **Remote Sensing** (Q1, MDPI, ISI Journal)
- Invited Reviewer of **Forests** (Q1, MDPI, ISI Journal)
- Invited Reviewer of **International Journal of Remote Sensing** (Tier1, Q1, ISI Journal)
- Invited Reviewer of International Journal of Image and Data Fusion
- Invited Reviewer of International Journal of Distributed Sensor Networks
- Invited Reviewer of International Journal of Imaging Systems and Technology (Q2, Journal)
- Invited Reviewer of International Journal of Digital Earth
- Invited Reviewer of International Journal of Pavement Engineering
- Invited Reviewer of International Journal of Food Properties

- Invited Reviewer of IEEE Transactions on Artificial Intelligence

- Invited Reviewer of IEEE Transactions on Geoscience and Remote Sensing (Tier1, Q1, ISI Journal)

- Invited Reviewer of IEEE Transactions on Industrial Informatics (Q1, ISI Journal)

- Invited Reviewer of IEEE Transactions on Emerging Topics in Computational Intelligence

- Invited Reviewer of IEEE Transactions on Radiation and Plasma Medical Sciences (Q1, ISI Journal)

- Invited Reviewer of IEEE Transactions on Vehicular Technology

- Invited Reviewer of IEEE Transactions on Human-Machine Systems

- Invited Reviewer of IEEE Transactions on Circuits and Systems for Video Technology

- Invited Reviewer of IEEE Access (Q1, ISI Journal)

- Invited Reviewer of IEEE Sensors Journal

- Invited Reviewer of IEEE Intelligent Systems (Q1, ISI Journal)

- Invited Reviewer of IET Image Processing (Q2, ISI Journal)

- Invited Reviewer of Geo-spatial Information Science

- Invited Reviewer of Sensors (Q2, Journal)

- Invited Reviewer of Computational Intelligence and Neuroscience (Journal, Hindawi)

- Invited Reviewer of Computer Methods in Biomechanics and Biomedical Engineering

- Invited Reviewer of Mathematical Problems in Engineering (Journal, Hindawi)

- Invited Reviewer of Journal of Spatial Science (Q2, Journal, Taylor, and Francis)

- Invited Reviewer of Journal of Healthcare Engineering (Q2, Journal, Hindawi Limited)

- Invited Reviewer of IETE Technical Review (Q2 Journal)

- Invited Reviewer of IETE Journal of Research (Q4 Journal)

- Invited Reviewer of Transactions in GIS (Wiley-Blackwell Publishing Ltd, Q1 Journal)

- Invited Reviewer of Transactions on Network Science and Engineering (Journal)

- Invited Reviewer of Connection Science (Q3, AI, Taylor and Francis AS, Journal)

- Invited Reviewer of Industrial Lubrication and Tribology (Q3, Emerald Group Publishing Ltd., Journal)

- Invited Reviewer of Transactions on Consumer Electronics (Q1, IEEE Transactions, Journal)

- Invited Reviewer of Industrial Lubrication and Tribology (Emerald Group Publishing Ltd., Q2, Journal)

- Invited Reviewer of Imaging Science Journal (Maney Publishing, Q2, Journal)

- Invited Reviewer of Cybernetics and Systems (Taylor and Francis Ltd.)

- Invited Reviewer of Open Geosciences

- Invited Reviewer of Geocarto International

- Invited Reviewer of Engineering Reports

- Invited Reviewer of Journal of Agricultural Engineering

SKILLS

Computer Languages	Python, Java, Processing, R, C, MATLAB, Golang
Tech Stack	Google Cloud Platform (GCP), AWS, SageMaker, S3, Flask, Docker, Streamlit
Software & Tools	Git, RapidMiner Studio, Google Data Studio, Tableau, Power BI
Machine Learning Libraries	Pytorch, TensorFlow and Keras, Theano, Pandas, Scikit-Learn
Other Libraries	Hugging Face, Gradio, GDAL, Beautiful Soup and Selenium, Seaborn and Plotly
Model Evaluation	Weights and Biases (WandB), TensorBoard, Streamlit
GitHub	https://github.com/kaopanboonyuen