

HIYA ROY

(+1) 914-309-6131 ◊ hiyaroy12@gmail.com ◊ <https://hiyaroy12.github.io/>

EDUCATION

The University of Tokyo, Japan

Sept 2017 – Mar 2021

Doctor of Philosophy (Ph.D)

Department of Electrical Engineering & Information Systems, GPA: **3.9/4**

Dissertation Topic: Deep Learning for Planetary Exploration: Improving image analysis capabilities under limited data resources.

The University of Tokyo, Japan

Sept 2015 – Aug 2017

Master of Science (M.S)

Department of Electrical Engineering & Information Systems, GPA: **3.94/4**

Dissertation Topic: Planetary surface image recognition using deep learning.

Jadavpur University, India

July 2008 - June 2012

Bachelor of Engineering (B.E)(Hons.)

Department of Electrical Engineering, GPA: **8.57/10** (Top 10%)

WORK EXPERIENCE

Rakuten Institute of Technology (RIT) Boston

Apr 2021 – Present

Position: Researcher at RIT with expertise in Machine Learning (ML) and Computer Vision (CV).

Image Enhancement for e-Commerce: Led the Creative AI team in developing state-of-the-art CV models to generate aesthetically appealing e-commerce images, improving the conversion rate on Rakuten's e-commerce website.

- **Automated Image Clean-Up for Rakuten Marketplace Images:** Developed a PyTorch-based framework to detect and remove digitally added elements from product images for advertisement purposes. This involved (i) **detection** of digital elements, and (ii) **inpainting** the detected digital elements, to help product images stand out in the marketplace. My image clean-up algorithm was adopted by Rakuten's Business Unit as an in-house solution in Japan with an estimated monthly impact of 918M GMS (3yr LTV GMS).

- **Image Inpainting and Translation for Rakuten Banners:** Built an automated system for text detection and translation in advertisement banners using a multimodal ML approach. The solution leveraged PyTorch for training models that detect and replace text in banners, improving retargeting strategies.

- **Multimodal Image Content Analysis for Rakuten Travel:** Applied zero-shot classification using CLIP and BLIP2 for multimodal image-to-language tasks such as image content understanding and object classification. Used PyTorch to optimize model performance and scalability.

- **Image Quality Enhancement for Rakuten Travel :** Designed and implemented an image enhancement pipeline for low-quality hotel images. Employed PyTorch to train models for **predicting blur scores** and applied **super-resolution** algorithms to improve image quality, enhancing customer engagement.

- **Stakeholder Communication:** Regularly improved technical solutions to meet customer requirements, presented technical findings to cross-functional teams, including non-technical stakeholders and thus ensured project progress.

NASA JPL (CalTech), USA

Oct 2019 – Jan 2020

Position: Visiting Student Researcher

Multitask learning for space applications: Worked with the Machine learning-based Analytics for Autonomous Rover Systems (MAARS) research group on the Robotic Surface Mobility Group (347F).

Developed a joint lightweight neural network framework based on PyTorch for multitask learning (image **segmentation** and **captioning**) onboard planetary rovers.

NEC Data Science Research Laboratories, Japan

Jan 2017-Mar 2017

Position: Research Intern

- Worked on Automatic Target Recognition on SAR images using deep learning techniques.

Tata Power Company Limited, India

July 2012 – July 2015

Position: Lead engineer

- Worked as a core Electrical Testing engineer to conditionally monitor and test all electrical equipment, to carry out commissioning tests of new switchgear equipment and relay panels.

PUBLICATIONS

Journal

- **Roy H.**, Chaudhury S., Yamasaki T., Hashimoto T., **Image inpainting using frequency domain priors**, SPIE Journal of Electronic Imaging, 30(2), 023016 (2021).
- **Roy H.**, Chaudhury S., Yamasaki T., Hashimoto T., **Toward Better Planetary Surface Exploration by Mars Orbital Imagery Inpainting**, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (2020).

Conference

- **Roy H.**, Stenger B., **Text Removal In E-Commerce Images: A Comparison Of Inpainting Methods**, Accepted in British Machine Vision Conference (BMVC) 2024.
- Ono M., Rothrock B., Otsu K., Higa S., Iwashita Y., Didier A., Islam T., Laporte C., Sun V., Stack K., Sawoniewicz J., Daftry S., Timmaraju V., Sahnoune S., Mattmann C., Lamarre O., Ghosh S., Qiu D., Nomura S., **Roy H.**, **MAARS: Machine Learning-Based Analytics for Rover Systems**, IEEE Aerospace conference 2020.
- **Roy H.**, Chaudhury S., Yamasaki T., DeLatte D.M., Ohtake M., Hashimoto T., **Lunar surface image restoration using U-Net based deep neural networks**, 50th Lunar and Planetary Science Conference 2019.
- **Roy H.**, Yamasaki T., Hashimoto T., **Do hashtags help? – Image aesthetics prediction using only hashtags**, Women in Computer Vision Workshop (WICV), CVPR 2018.
- **Roy H.**, Yamasaki T., Hashimoto T., **Predicting Image Aesthetics using Objects in the Scene**, International Joint Workshop on Multimedia Artworks Analysis and Attractiveness Computing in Multimedia (MMArt and ACM) in conjunction with ICMR, June 2018.
- Chaudhury S., and **Roy H.**, **Can fully convolutional networks perform well for general image restoration problems?**, Intl. Conf. on Machine Vision Applications, 2017.

Book chapter

- **Roy H.**, Chaudhury S., Yamasaki T., Hashimoto T., **Chapter 6: Planetary image inpainting by learning mode-specific regression models**, “Machine Learning for Planetary Science”, 1st Edition, Elsevier Science and Technology Books.

TECHNICAL SKILL

Frameworks PyTorch, Tensorflow, scikit-learn, CUDA, cuDNN, MXNET, Pandas, Docker.
Language and Tools Python and Matlab; Conda, Jupyter, Git, OpenCV, Latex, Microsoft Office.

AWARDS AND ACHIEVEMENTS

- Awarded **MEXT Scholarship** by the Government of Japan (**Ministry of Education, Culture, Sports, Science and Technology of Japan**) for graduate studies. Oct 2015 - Aug 2020
- Awarded certificate for **Global Leader Program for Social Design and Management(GSDM)** by the University of Tokyo. Oct 2016 - Mar 2021
- Secured **rank 278 (99.722 percentile)** in **WB Engineering Entrance Examination** 2008.
- Participated in CSIR Program on Youth for leadership in Science for outstanding performance [**rank:20 (99.997 percentile)**] **WB Secondary Board Examination** 2006.

MEDIA COVERAGE

Our work on image inpainting using frequency-domain priors has been introduced in multiple tech blogs: **SPIE news**, **Marktechpost.com**, and **TechXplore**.