PRAKASH CHANDRA CHHIPA

Doctoral Researcher at Luleå University of Technology, Sweden
prakash.chandra.chhipa@ltu.se, +46-765923073
Google scholar, GitHub, LinkedIn, Lulea University Profile

SUMMARY & VISION

Pursuing Doctoral research studies after 8 years in industrial machine learning R&D -

A self-motivated, lifelong learner with a research mindset at the core. I am currently pursing doctoral studies and striving to get answers to many research questions on representation learning which I had gathered during my industrial R&D tenure. I have worked in multiple MNCs in the field of computer vision focusing applied research and development for a decade, led to proven track record from developing ideas to delivering commercialized machine learning products and intellectual properties in medical, healthcare, and multimedia domain. Currently, I'm actively looking for research collaborations through research visits on mutual research interests.

CURRENT APPOINTNENT

- **Position** - Doctoral Student in ML Group, Luleå University of Technology, Sweden (2020 - 2024)
  - Research Goal– Reducing Supervision in Computer Vision by Enhancing Self-Supervision for Natural Visual Concepts and Beyond
  - Research Interests – Self-supervised Learning, Representation Learning, & Multi-objective Optimizations
  - Domains - Medical Images, Natural Scenes, Beyond Natural Scenes
  - Supervisors –
    - Prof. Marcus Liwicki, ML Group, Luleå University of Technology, Sweden (main)
    - Prof. Seiichi Uchida, Human Interface Laboratory, Kyushu University, Japan
    - Dr. Rajkumar Saini, ML Group, Luleå University of Technology, Sweden
  - Current Status – Continuing doctoral research after licentiate degree (Ph.D.'s midway milestone in Swedish universities)

PUBLICATIONS

- Chhipa, P. C., Holmgren, J. R., De, K., Saini, R., & Liwicki, M. (2023). Can Self-Supervised Representation Learning Methods Withstand Distribution Shifts and Corruptions?." CVF International Conference of Computer Vision Workshops, (ICCVW 2023, Paris, France).
- Chhipa, P. C., Chopra, M., Mengi, G., Gupta, V., Upadhyay, R., Chippa, M.S., De, K., Saini, R., Uchida, S., & Liwicki, M. (2023). Functional Knowledge Transfer with Self-supervised Representation Learning." IEEE International Conference on Image Processing (ICIP 2023).
- Chhipa, P. C., Upadhyay, R., Pihlgren, G. G., Saini, R., Uchida, S., & Liwicki, M. (2023). Magnification Prior: A Self-Supervised Method for Learning Representations on Breast Cancer Histopathological Images." CVF Winter Conference on Applications of Computer Vision, (WACV 2023, Hawaii, USA).
- Chhipa, P. C., Upadhyay, R., Saini, R., Lindqvist, L., Nordenskjold, R., Uchida, S., & Liwicki, M. (2022). Depth Contrast: Self-Supervised pretraining on 3DPM Images for Mining Material Classification." European Conference on Computer Vision Workshops, (ECCVW 2022, Tel Aviv, Israel).
- Chopra, M.*, Chhipa, P. C.*, Mengi, G.*, Gupta, V., & Liwicki, M. (2023). Domain Adaptable Self-Supervised Representation Learning on Remote Sensing Satellite Imagery." IEEE International Joint Conference on Neural Networks (IJCNN 2023, Gold Coast, Australia). **authors with equal contribution*
- Gupta, E., Gupta, V., Chopra, M., Chhipa, P. C., & Liwicki, M. (2023). Learning Self-Supervised Representations for Label Efficient Cross-Domain Knowledge Transfer on Diabetic Retinopathy Fundus Images." IEEE International Joint Conference on Neural Networks (IJCNN 2023, Gold Coast, Australia).
- Upadhyay, R., Chhipa, P. C., Phlypo, R., Saini, R., & Liwicki, M. (2023). Multi-Task Meta Learning: learn how to adapt to unseen tasks. IEEE International Joint Conference on Neural Networks (IJCNN 2023, Gold Coast, Australia).
- Pihlgren, GG., Nikolaidou, K., Chhipa, P. C., Abid, N., Saini, R., Sandin, F., & Liwicki, M. (2023). A Systematic Performance Analysis of Deep Perceptual Loss Networks Breaks Transfer Learning Conventions. arXiv preprint arXiv:2302.04032.
- Mishra, A.R., Kumar, R., Gupta, V., Prabhu, S., Upadhyay, R., Chhipa, P.C., Rakesh, S., Mokayed, H., Liwicki, M., Liwicki, F.S., Saini, R. (2023). MSE v1.0: Open-Access Multimodal Electroencephalography and Signature Database for Biometric Systems." – *Under review*.
- Gautam, S., Pradhan, D., Chhipa, P. C., Nakajima, S., "MicroGAN: Size-invariant Learning of GAN for Super-Resolution of Microscopic Image." MICCAI, Computational Pathology (COMPAY) Workshop, (MICCAIW 2019, Shenzhen, China).
- Södergren. I, Nodeh. M, Chhipa. P, Nikolaidou. K, Kovács. G. "Detecting COVID-19 from audio recording of coughs using Random Forests and Support Vector Machine". Interspeech 2021, Brno, Czechia, September 2021
- Saini. R, Upadhyay. R, Prabhu. S, Chhipa. P, Rakesh. S, "Imagined object recognition using EEG-based neurological brain signals", Recent Trends in Image Processing & Pattern Recognition (RTIP2R), 2021, Malta

- Rakesh. S, Liwicki. F, Mokayed. H, Upadhyay. R, Chhipa. P, Saini. R, "Emotions classification using EEG in Healthcare", International Conference on Computer Vision and Machine Intelligence (CVMI), 2022, India
- Liwicki, F. S., Upadhyay, R., Chhipa, P.C., Murphy, K., Federico, V., Östersjö. V, Liwicki. M., "Deep Neural Network approaches for Analysing Videos of Music Performances", arXiv preprint, arXiv:2205.11232

THESIS

- Licentiate Thesis Title- Self-supervised Representation Learning for Visual Domains Beyond Natural Scenes." Luleå tekniska universitet, Sweden (March 2023). Link.

ACADEMIC PRESENTATIONS

- (*Upcoming*) Oral presentation for functional knowledge transfer in SSL paper at IEEE International Conference on Image Processing, Malaysia, October 2023
- Two oral paper presentations at IEEE International Joint Conference on Neural Networks, QN, Australia, June 2023
- *Invited* poster presentation on "Towards Reducing Human Dependency for Efficient & Accurate Diagnosis of Breast Cancer in Women" at South Africa & Sweden University Forum (SASUF), University of the Western Cape, Cape Town, South Africa, March 2023
- Seminar presentation on "Self-supervised representation learning on beyond the natural visual concepts" at Center for Research in Computer Vision (Prof. Mubarak Shah), University of Central Florida, USA, January 2023
- Oral presentation and poster for Magnification-prior self-supervised learning paper at CVF Winter Conference on Applications of Conference Vision, HI, USA, January 2023
- *Invited* speaker with 30 minutes presentation on self-supervised methods at MIRAI AI (Artificial Intelligence) Group, MIRAI 2.0 R&I Week, Kyushu university, Fukuoka, Japan, November 2022
- *Invited* seminar presentation on "Self-supervised methods on breast cancer histopathology images" at European Bioinformatics Institute, European Molecular Biology Laboratory, Cambridge, UK, November 2022
- Spotlight presentation and poster session for Depth contrast paper at European Conference on Computer Vision Workshop, Tel-Aviv, Israel, October 2022
- A poster presentation on "Self-supervised Representation Learning on microscopic images" at ELLIS Doctoral Symposium, University of Alicante, Spain, September 2022
- A poster presentation on "Self-supervised Representations on Breast Cancer Images" at MLSS, Department of Engineering, University of Cambridge, United Kingdom, July 2022
- A presentation on "Reducing Supervision in Computer Vision by Enhancing Self-Supervision for Beyond the Natural Visual Concepts" at Norwegian Artificial Intelligence Research Consortium 2021, Oslo, Norway
- A presentation on "Reducing Supervision in Computer Vision by Enhancing Self-Supervision" at Swedish Artificial Intelligence Society workshop 2021, Luleå, Sweden
- A short lecture on "Machine Learning with few data sets" at Applied AI Digital Innovation Hub 2021, Luleå, Sweden

FORMAL EDUCATION

- Luleå University of Technology, Sweden
  Doctor of Philosophy – Machine Learning (Oct 2020 – Oct 2024 (expected))
  Licentiate Degree – Machine Learning (Oct 2020 – March 2023)
- University of Rajasthan, India
  Master's Degree - Computer Science (Master of Computer Applications), 3-year program (2006-2009)
  Bachelor's Degree – Mathematics & Physics (Bachelor of Science), 3-year program (2003-2006)

ADDITIONAL SCHOOLS

- University of Cambridge, United Kingdom
  Cambridge Ellis Machine Learning Summer School, 2022
- University of Oxford, United Kingdom, AIGG, and CIFAR
  Oxford Machine Learning Summer School, 2022

RECEIVED GRANTS

- Travel grant to participate in MIRAI2.0 Research and Innovation week, November 15-18 2022, Kyushu, Fukuoka, Japan from Intsam, a coordinating group for Swedish governmental research funding agencies.
- Travel grant to participate in South Africa & Sweden University Forum (SASUF), Research and Innovation week, March 27-31 2023, Cape Town & Johannesburg, South Africa, from coordinating group for Swedish governmental research funding agencies.

ADDIONTIONAL ROLE

- Session chair at IEEE International Joint Conference on Neural Networks, QN, Australia, 2023
- Session chair at 16th International Conference on Document Analysis and Recognition, Lausanne, Switzerland, 2021
- Organizing committee member – Swedish AI Society Workshop 2021, DeepLearn Autumn School 2022

CONFERENCE ATTENDED

- IEEE International Joint Conference on Neural Networks (IJCNN), QN, Australia, 2023
- CVF Winter Conference on Applications of Computer Vision (WACV), HI, USA, 2023
- European Conference on Computer Vision (ECCV), Tel Aviv, Israel, 2022

- International Conference on Document Analysis and Recognition (ICDAR), Lausanne, Switzerland, 2021
- Interspeech Conference, Brno, Czechia, 2021
- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), Shenzhen, China, 2019

---------- Industrial R&D work Details----------

INDUSTRIAL R&D WORK EXPERIENCE (10 YEARS, THREE AI PRODUCT COMMERCIALIZED)

- Arkray Research & Development (2018 - 2020) | Lead Data Scientist
  - Aution Eye AI Urinalysis - 4510: Research and development for Urinalysis, computer vision based sediment recognition on microscopic low resolution histopathology images. Commercialized in 2019 with one research publication and two invention disclosures filed as patents.
  - Bio-marker discovery exploiting RNA sequence and blood-glucose prediction with varying hematocrit level
- Samsung Research Institute (2012 – 2018) | Staff Engineer – AI & Data Intelligence Group
  - Samsung Ads - Periodical advertise recommendation without viewer profile by employing POMDP & multi-arm bandit and crowd forecasting on view actions through hidden Markov modeling. Commercialized in 2013 with one invention disclosures filed as patent.
  - Samsung ACR – long term project for real-time viewership and interest estimations through Live TV program & channels identification, Recorded TV program recognition, On-screen object & celebrity detection, music recognition by employing computer vision methods. Commercialized in 2018 with multiple invention disclosures filed as patents.
- HCL Technologies (2010 – 2012) | Associate Consultant
  - Software development of Service Oriented Architecture enabled platform for Telcom T-Mobile

SKILLS

- Statistics & Mathematics: Probability Theory, Calculus, Bayesian methods, Pareto, Markov (POMDP, HMM), optimization methods
- Deep Learning: Neural Networks (CNNs, RNNs), Transformers
- Programming Languages & frameworks: Python, Java, C++, PyTorch, TensorFlow

PATENTS

ARKRAY R&D -

- Image Generation Learning Apparatus, Image Generation Apparatus, Method, And Program, JP2019-152860
- Method and system for urine components examination on microscopic images using AI. JP2020-252660

Samsung R&D Institute -

- A System & A Method of Forecasting Actions of Viewers Viewing Advertisements, 6735/CHE/2015
- System and Method for interactive visual media generation using generative AI models, IN201811030218
- Method and apparatus for adjusting augmented reality content, US11024263B2, WO2019143117, EP3676656
- A System & Method for Targeted content delivery in blockchain network, IN201811039652
- Display device for transmitting advertisement content and control method thereof, KR1020200044692
- Method and apparatus for managing a wide view content in a virtual reality environment, US10706632B2, WO2019098609, EP3639523
- Digital Content Rendering, IN201711040660
- Methods for providing augmented reality (AR) content, and devices thereof, IN201811002097
- Display device for transmitting advertisement content and method for controlling same, WO2020080874, US20220005072

ADDITIONAL COURSEWORKS

- Deep Learning Specialization (5 courses): deeplearning.ai (Aug 2017 – Aug 2018)
- Data Science Specialization (5 coursers): Coursera.org – John Hopkins University (Dec 2014)
- Machine Learning: Coursera.org- Stanford University (July 2017)
- Machine Learning Foundations: A Case Study: Coursera.org – Washington University (Nov 2015)
- Learning from Data (Machine Learning): edx.org – Caltech (Dec 2014)
- Programming in Python: edx.org – Massachusetts Institute Of Technology (Aug 2014)
- In-Memory Data Management - Implications on Enterprise Systems: Hasso Plattner Institute (2012)

AWARDS AND RECOGNITION

- Outstanding Performance Awards – 2015 and 2018, Samsung R&D for Product innovation
- IP (Intellectual Property) Creator of the Year 2017, Samsung R&D leading inventions
- Patent Generation Awards - 2016, 2017, Q1 2018, and Q2 2018 for achieving A-grade inventions