Lois Anne Leal

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EXPERIENCE

Philippine Space Agency (PhilSA)
Senior Science Research Specialist
Quezon City, Philippines
06.2023–Present

- Leading the creation of the Philippine connectivity map using image retrieval and classification
- Leading the creation of building detection system through instance segmentation for disaster risk and reduction management
- Tasked to conduct research and development related to artificial intelligence applications covering all PhilSA divisions such as but not limited to projects concerning space-based surveillance and space data mobilization and applications
- Conducting presentations and workshops internally and externally regarding artificial intelligence and data science

University of Surrey, Computer Vision, Speech, and Signal Processing (CVSSP)
AI Data Analyst
Surrey, United Kingdom
03.2023-04.2023

- Implemented and evaluated techniques for Scene Recognition on Videos, Image-to-Video Segment/Moment Retrieval, and Text-to-Video Retrieval using self-prepared BBC News UK Dataset

Philippine Space Agency (PhilSA)
Science Research Specialist I
Quezon City, Philippines
01.2022-12.2021

- Fixed existing object detection models by experimenting and fine-tuning networks from research papers leading up to 94% AP for the detection performance which enabled fast daily reports to stakeholders and reduction of manual work
- Extended object detection capabilities to both SAR and optical satellite images with varying resolution/modes
- Enabled updated view of the evaluation of the model performance by building a continuous evaluation system and thus, enabled the extension of the geographical coverage and performance of models
- Introduced a machine learning system for helping fisherfolks find new areas for fishing; results represented PhilSA in 27th Asia-Pacific Regional Space Forum (APRSAF-27)

Omdena in partnership with iRAP (international Road Assessment Programme)
Machine Learning Engineer
California, USA
11.2020-06.2022

- Initiated group sprints for data preparation activities which led the team to identify early issues to be taken into account for model development
- Built a computer vision system for automatically extracting vehicle count in satellite images and delivered a technical report to iRAP as featured in their company website

Stamina4Space (PHL-MicroSat)
Research Student Assistant
Quezon City, Philippines
08.2019-03.2020

- Delivered exploratory data analysis reports from satellite data which assist researchers on understanding micro satellite instabilities

Computer Vision and Machine Intelligence Group (CVMIG)
Undergraduate Student Researcher
Quezon City, Philippines
08.2019-08.2020

- Investigated generalization capabilities of Mask R-CNN for road removal by experimenting with data annotation schemes, augmentations, scale, dataset combinations (aerial LiDAR and/or optical satellite images), contrasts, and varying area topographies
- Best model achieved a dice score of 74.07% and an IoU score of 65.61% on created image datasets
- Collaborated with UP Resilience Institute, PHILVOCS, and other geologists

Thinking Machines Data Science Inc.
Data Science Intern
Bonifacio Global City, Philippines
06.2019-07.2019

- Deployed software for automatic reimbursements of expenses, removing 100% of manual work from employees
- Delivered exploratory data analysis outputs involving structured data which were included in white papers delivered to company partners
- Presented a data analysis capstone project on NBA statistics on the topic of player performance during playoffs and seasons

EDUCATION

UNIVERSITY OF SURREY
Surrey, United Kingdom
2022-2023

M.Sc. in Computer Vision, Robotics, and Machine Learning (Distinction)
Scholarship: Foreign Graduate Scholarship, Department of Science and Technology (DOST)
Supervisor: Prof Dr Miroslaw Bober
Thesis: *"Comparative Evaluation of 2D COVID-19 Recognition Systems*
Using Chest CT Images" (nominated for MSc Project Prize; mark: 86%)
Research Group: Centre for Vision, Speech, and Signal Processing (CVSSP)
MSc Tutor: Prof Dr Richard Bowden
Date of Award: 21.04.2023 **Term End:** 07.02.2023

UNIVERSITY OF THE PHILIPPINES DILIMAN
Quezon City, Philippines
2016-2020

B.Sc. in Computer Science (Cum Laude *standing*; College Scholar)
Scholarships: Junior Level Science Scholarship (Merit), Department of Science and Technology (DOST)
Data Science Student Grant, Thinking Machines Data Science Inc.
BSc Scholarship, Philippine Government
Thesis: *"Road Segmentation from Multi-Modal Imagery of Ilocos Norte using Mask R-CNN " (mark: 1.0/1.0)*
Supervisors: Kristofer delas Penas and Riza Rae Pineda
Research Group: Computer Vision and Machine Intelligence Group (CVMIG)
Rank: 9 out of 81 CS students
Date of Award: 25.11.2020

RESEARCH INTERESTS

The ultimate goal of my research is to **enable continuous delivery of reliable intelligent systems while reducing development costs** with the focus on the field of **computer vision**.

- Evaluation and Explainability
- Model Calibration
- Continual Learning
- Out-of-distribution Detection
- Domain Generalization
- Domain Adaptation

LIST OF PUBLICATIONS

BSc/Master Dissertations

- L. Leal and M. Bober. **Comparative Evaluation of 2D COVID-19 Recognition Systems Using Chest CT Images**, M.Sc. Thesis, University of Surrey, 2022. *(nominated for MSc Project Prize; mark: 86%)*
- L. Leal, C. Espino, K. Delas Penas, and R. Pineda. **Road Segmentation from Multi-Modal Imagery of Ilocos Norte using Mask R-CNN**, B.Sc. Thesis, University of the Philippines Diliman, 2020. *(mark: 1.0/1.0)*

Technical Reports/Oral Presentations

- *J. Rayo, *L. Leal, M. Felix, O. Enricuso, and G. Perez. **Identifying Fishing Grounds in the Philippines using Earth Observation Data and Machine Learning**, Asia Pacific Regional Space Agency Forum (APRSAF-27), 2021.
- L. Leal and C. Baradkar. **Using Convolutional Neural Networks To Improve Safety and Save Lives**, Omdena, 2021.

SELECTED RESEARCH/COURSE PROJECTS

Ship Detection Using Synthetic Aperture Radar (SAR) and Optical Satellite Images for Monitoring Ship Presence in the Philippine Waters

This project developed object detection systems which detect and report the presence of ships inside the Philippine waters. Datasets include images captured in different resolutions and modes. These systems were used for daily reporting to partner agencies. Best model reached up to 94% AP.

Telecom Tower Inventory System

This project developed an object detection system which supports inventory tasks by automatically detecting towers given an optical satellite image and outputs an updated geo-shapefile that can be directly overlaid to a map. Best model reached up to 84% AP.

Finding Productive Fishing Grounds in the Philippine Waters

This project aims to identify new productive fishing grounds in municipal waters by using the environmental features of where fisherfolks currently fish. Datasets consist of VIIRS vessel boat detection data using night lights, chlorophyll-a, bathymetry data, and sea surface temperatures (SST). Methods include DBSCAN for clustering, and XGBoost for prediction. Best model reached up to 88% f1-Score.

Visual Search: Experiments on Various Descriptors and Similarity Metrics

This work explores the problem of visual search using the Microsoft Research Cambridge v2 (MSRC-v2) dataset. Various descriptors include color and texture-based such as Global Color Histogram, Spatial Color Grid, Edge Orientation Histogram (EOH) and color+EOH, and CNN-based such as with VGG16, ResNet50, and InceptionV3. Moreover, I also looked at similarity metrics such as Euclidean, Manhattan, Chebyshev, and Mahalanobis Distance. Best model reached up to 78.97 for precision@10, 26.63 for recall@10, and 70.07 for precision@20 and 47.17 for recall@20.

Image Classification with Intel Dataset

This work explores data preparation, identification of appropriate evaluation metrics, visualization of activation maps, and experiments on the model such as a CNN architecture I made from scratch as a baseline, pre-trained CNN architectures and transfer learning, ablations on InceptionV3, data augmentation techniques, and fine-tuning. Best model reached 92.20% accuracy.

Vehicle Count Reporting using Satellite Images

This project explores the task of image regression using CNNs such as modified CNN from a paper, VGG, ResNet50, and InceptionV3 to output the vehicle count given a geotagged shapefile from the user. Best model reached 2.7688 RMSE.

Something Fishy: Real-time ML Classifier Camera App

This real-time mobile camera app helps teenagers to correctly identify specific fish species in local markets. We used MobileNet which is a small efficient CNN converted to mobile setting using TFLite and finally, deployed as an Android App in Google Play Store *(was only made available in play store during the class duration)*.

INVITED TALKS

2nd Philippine Data Festival (Philippine Statistics Authority)
Manila, Philippines
2023

Topic: Analyzing the Philippines from Space

(Plenary and Open Forum: The Future of Data: Current Trends in Big Data and Analytics)

IEEE SIESGST Epsilon Symposium: AI Track

Topic: "AI and the Ultimatum"

Google Developer Groups (GDG), Women Techmakers
Manila, Philippines (virtual)
2021

Topic: "Passing the TensorFlow Developer Exam" for International Women's Day

Google Cloud Manila DevFest
Makati, Philippines
2019

Topic: "AI for Impact: Automatic Fault Line Detection"

SELECTED CERTIFICATIONS

TensorFlow Developer Exam, TensorFlow	*2021*
Deep Learning Specialization, deeplearning.ai	*2020*
Machine Learning, Stanford Online	*2020*
Deep Learning Nanodegree, Udacity	*2019*

PROGRAMMING SKILLS

Operating Systems	Linux, Windows
Programming	Python, Matlab, C/C++
Tools	Jupyter Notebook, Tableau, QGIS, Photoshop
Libraries	TensorFlow/Keras, PyTorch, Matplotlib, Seaborn, Scikit-learn, Pandas, Numpy