**Sagun Gopal Kayastha**

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**EDUCATION**

**University of Houston,** Houston, Texas, USA
Ph.D. in Atmospheric Sciences, 2022-present

**Kathmandu University**, Dhulikhel, Nepal
B. Tech in Environmental Engineering, 2012-2016

**WORK EXPERIENCE**

**Research assistant: Department of Earth and Atmospheric Sciences University of Houston, Houston, Texas, United States (2022-present)**

- Missing Data Imputation in Satellite Imagery and surface measurement stations using Machine Learning and AI techniques.
- Enhancing Satellite $NO_2$ Retrieval Using Physics-Constrained, Online Bias-Corrected AMF Calculations.

**Remote AI Consultant: Pollensense LLC, Utah, United States. (Sept 2019-2022):**

- Pollenhunter**:** Deep Learning-based pollen detection/classification system to provide real-time pollen and mold counts.
- Development of Data-driven pollen count forecasting model – that uses a combination of tree-based learning techniques and Neural Network models

**AI Developer: Inspiring Lab Pvt. Ltd, Kathmandu, Nepal (Jan 2019-2022):**

- Real-Time Vehicle Tracking and Recognition System (RTVTR)
- Dataset and Art Generation using Generative Adversarial Network
- System Optimization for Real-Time Vehicle Tracking and Recognition System.

**Environment Engineer: Environment Resource Group Pvt. Ltd, Kathmandu, Nepal (April 2018- Nov 2018)**:

- Initial Environmental Examination (IEE) of Upper Paluwa Small Hydropower project and Dordi HEP Transmission Line.
- Content Editor for Hydro Nepal Journal, 2018

**WASH Officer: Community Development Forum, Kathmandu, Nepal: (Jan 2017- Jan 2018)**

- Research and Development of WASH projects, Development of WSSCC sanitation TOT manual.

- Coordination and organization of National Policy Level Workshop on Menstrual Hygiene Management (MHM)

**Researcher: The International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal, (2016)**:

- Thesis for Undergraduate Final Year Project," Modeling the effect of Wildfire on Air Quality of Kathmandu Valley."

**RESEARCH INTERESTS** Air Pollution, Atmospheric, and Climate Modeling, Machine Learning and Artificial Intelligence

**COMPUTER SKILLS**

**Programming**: Python, C++, Fortran, Matlab, Shell
**Framework, Libraries**: Numpy, Pandas, Matplotlib, Scikit-learn, Xarray Pytorch, TensorFlow, Opencv, Tensorrt;
**Operating Systems**: Linux, Windows;
**Others**: AutoCAD, GIS, WRF, GIT, AWS EC2/S3

**PROJECTS**

**Estimating Surface PM $_{2.5}$ from Satellite Aerosols, 2023-present:** High-resolution daily surface-level estimates of fine particulate matter (PM2.5) concentrations (ug/m3) in a 1 km by 1 km grid over Texas for 2018 through 2022, using high-resolution remotely-sensed aerosol retrievals from the Moderate Resolution Imaging Spectroradiometer (MODIS) instrument on board the Terra and Aqua satellites with other remotely-sensed predictor variables (e.g., satellite data, meteorology, demographics) and in situ measurements (e.g., meteorology, demographics) using newly-developed artificial intelligence/machine learning (AI/ML) methods deep learning (DL) models. Funded by Texas Commission on Environmental Quality (TCEQ)

***PollenHunter, Pollen Detection and classification system, 2020-2022 :*** A system for processing raw microscopic images for training, evaluation, and deployment of the trained model on edge devices. The trained models use AI-based Detection and Classification algorithm to provide Real-time pollen/mold count reporting through the Pollenwise App.
**Pollen Forecasting Model, 2021-2022** A combination of tree-based learning techniques and Neural Network models that uses six different meteorological variables for pollen count forecasting.

**Face Recognition System, 2020- 2022:** A facial recognition system with live flagging and storing the detected faces, searching detected faces in a database with Onnx/Tensorrt integration for faster detection and processing.

***Real-Time Vehicle Tracking and Recognition System, 2019 - 2022:*** The system uses a Video Processing pipeline with various machine learning

models to detect and classify the vehicles in different categories, extract and track the number plates with additional customization for flagging, and analytics. Optimization and testing of Vision models on Nvidia Jetson TX2.
**Biomass Cookstove Labelling System, 2017** A labeling system developed to classify Biomass Cookstoves according to parameters provided by the international ISOIWA Tier System and NIBC Standards for Biomass Cookstoves 2016/17. The system's user acceptance questionnaire and scoring were developed by the Centre for Rural Technology, Nepal, in coordination with the Alternative Energy Promotion Centre (AEPC) with support from The World Bank.

**Modeling the effect of Wildfire on Air Quality of Kathmandu Valley, 2016:** Evaluating the setup for conducting modeling experiments over Kathmandu Valley using the Weather Research and Forecasting Model with Chemistry (WRF-Chem). This study examines the contribution of wildfires in the South Asian region to the total Aerosol Optical Depth (AOD) in Kathmandu Valley, utilizing WRF-Chem and Moderate Resolution satellite data.

**OTHER EXPERIENCES**

Course instructor - Machine Learning and Artificial Intelligence Training program by Inspiring Lab at Sunway International College (2019) and Lumbini ICT (2021).
Kaggle Competitions: SIIM-ISIC Melanoma Classification, Deepfake Detection Challenge
Feminist Tech Exchange workshops - Facilitating sessions on AI and Ethics in gatherings among activists, artists, tech enthusiasts, and students.
Researcher - Finding SRHR Needs for Young People who are displaced by the 2015 Nepal Earthquake.
Technical Officer (2023-2024), Cougar AI, University of Houston
Rice Datathon, 2023.

**PUBLICATIONS**

Kayastha, S. G., Ghahremanloo, M., Park, J., Singh, D., Westenbarger, D., & Choi, Y. (2024). A Deep Learning Framework for Satellite-Derived Surface $PM_{2.5}$ Estimation: Enhancing Spatial Analysis in the United States. https://doi.org/10.1175/AIES-D-24-0028.1

Salman, A. K., Choi, Y., Singh, D., Kayastha, S. G., Dimri, R., & Park, J. (2025). Temporal CNN-based 72-h ozone forecasting in South Korea: Explainability and uncertainty quantification. Atmospheric Environment, 343, 120987. https://doi.org/10.1016/j.atmosenv.2024.120987

Park, J., Choi, Y., & Kayastha, S. (2024). Local and transboundary contributions to nitrogen loadings across East Asia using CMAQ-ISAM and GEMS-informed emissions inventory during the winter-spring

transition  EGUsphere, 1–33. https://doi.org/10.5194/egusphere-2024-3312

**REFERENCES**

Yunsoo Choi,
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Kundan Lal Shrestha
Assistant Professor, Kathmandu University, Dhulikhel, Nepal. Email: *kundanku.edu.np*