Sagun Gopal Kayastha

Email: sgkayast@cougarnet.uh.edu

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.
- AI Emulators for Numerical Weather and Air quality models.

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 a 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 Training of Trainers (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, Dask, Ray, Scikit-learn, 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, 2023-2024: High-resolution daily surface-level estimates of fine particulate matter ($PM_{2.5}$) concentrations in a 4 km by 4 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 A thesis Study that evaluates setup for conduction modeling experiments over Kathmandu Valley with Weather Research and Forecasting Model including chemistry and Aerosols (WRF-Chem). Study of the contribution of Wildfire in the South Asian region to the total concentration of Aerosol Optical Density (AOD) in Kathmandu Valley with WRF-model using Moderate Resolution Study of the contribution of Wildfire in the South Asian region to the total concentration of Aerosol Optical Density (AOD) in Kathmandu Valley with WRF-model using Moderate Resolution.

OTHER EXPERIENCES

Technical Officer: Cougar AI (2023-2024).
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.
DIY- Workshop on Low-Cost Air Quality Sensors.

REFERENCES

Yunsoo Choi,
Associate Professor, University of Houston, Houston, Texas, United States
Email: *ychoi6@uh.edu*

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