AMNINDER SINGH

Data Scientist

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WORK EXPERIENCE

Climate LLC | Bayer Crop Science Nov 2022 – Present

Data Scientist- Remote Sensing (Nov 2023 - Present)

- Identified a gap and led the implementation of a new Land-Cover analysis, driving ~$450,000 in annual revenue for the Carbon business. Took ownership of the delivery and communication of this solution, ensuring all stakeholders were informed of the impact and rationale.
- Upgraded the USDA CDL historical data pipeline for PDF generation within five business days, achieving 30 to 50x faster PDF generation by optimizing server-side compute in Google Earth Engine and effectively addressing operational pain points.
- Improved field boundary delineation accuracy by 25% over baseline through implementation of advanced computer vision and image enhancement techniques.
- Designed, implemented, and validated scalable pipelines to extract field-level features, including cover crop, tillage, and previous crop, from multi-spectral and SAR remote sensing data, supporting strategic objectives for the Carbon business.

Geospatial Data Scientist (Nov 2022 - Nov 2023) - Contract

- Performed EDA, data cleaning, and leveraged existing pipelines to deliver high-quality remote sensing data to stakeholder teams within set timelines.
- Collaborated with team members in designing, developing, and testing geospatial pipelines for remote sensing data extraction and machine learning model deployment.
- Evaluated and analyzed spatial indexing systems such as Geohash, H3, and S2 to understand their viability for different use cases. Made recommendations and contributed to implementing spatial indexing systems, ensuring alignment with the team's requirements.

UC Riverside Jan 2018 – Oct 2022

Post Doctoral Scholar (Jan 2022 – Oct 2022) at USDA Salinity Lab

- Leveraged Google Earth Engine's Python API and Planet Labs APIs to get satellite data, including synthetic aperture radar (SAR), multispectral optical imagery, land use/crop type (USDA CDL, USDA NLCD), soil properties (SSURGO, POLARIS), weather (GRIDMET), and SRTM Digital Elevation Data (DEM).
- Implemented machine learning models (Random Forest, LightGBM) for soil moisture estimation using Python libraries.
- Leveraged time-series vegetative indices from multi-spectral imagery to quantify crop phenology and investigate correlations with soil salinity and texture.
- Collaborated with private companies and data scientists to implement new strategies and fulfill project requirements.
- Participated in soil surveys using electromagnetic (EM) induction, L-band radiometer, and soil sampling campaigns.

Graduate Student Researcher (Jan 2018 – Dec 2021)

Dissertation: Advancing Urban Landscape Irrigation Management using Smart Controllers and Machine Learning-based Models.

- Sampling and analyzing soil hydrology field measurements, including soil water potential, soil volumetric water content, infiltration, evapotranspiration, and weather data.
- Developed deep learning models including Artificial Neural Networks (ANN), Long Short-Term Memory (LSTM), and Convolutional Neural Networks (CNN) utilizing soil hydrology and time-series weather data.
- Collaborated and participated in several field campaigns supporting remote sensing projects.

CSU, Fresno | *Graduate Research Assistant* Aug 2015 – Dec 2017

Thesis: Use of EM-38 soil surveys in forage fields at a saline drainage water reuse site to calibrate a hydro-salinity model for decision support.

- Led soil surveys, sampling, and analysis to map soil salinity using geophysical measurements from an electromagnetic (EM) induction instrument.
- Analysis of the data using ArcGIS and R.

EDUCATION

University of California, Riverside, CA 2018 -2021
Ph.D. in Environmental Sciences (Soil & Water)
Awards: Best Oral Presentation Award - 2021 | SCSC-NWRI Fellowship, Southern California Salinity Coalition (SCSC), and the National Water Research Institute (NWRI), 2018-2020

California State University, Fresno, CA 2015 -2017
M.S. in Plant Sciences
Awards: Outstanding Thesis Award, Jordan College of Agricultural Sciences & Technology | The Gerald O. Mott Meritorious Graduate Student Award in Crop Science, Crop Science Society of America (CSSA), (2017)

Punjab Agricultural University, Ludhiana, Punjab, India 2011 -2015
B.S. in Agriculture (Soil Science, Agronomy & Agroforestry)

SKILLS

- Programming: Python (pandas, NumPy, matplotlib, seaborn, PySpark, etc.), Matlab, and R.
- Geospatial: Google Earth Engine, Descartes Labs, ArcGIS, QGIS.
    - Python: xarray, geopandas, shapely, rasterio, pystac_client.
- Machine Learning and Deep Learning: scikit-learn, TensorFlow, Keras, PyTorch.
- Version control: Git, GitLab, GitHub.
- Soil and environmental sensor network data acquisition systems.
- Geophysical soil sensing.
- Deployment: Django, Streamlit.
- Other: SQL, AWS, Google Cloud Platform.

PUBLICATIONS

Google Scholar Link

ACHIEVEMENTS AND AWARDS

- Attended IEEE GRSS-USC MHI 2023 Remote Sensing Summer School, from July 13 – 15, 2023, by IEEE Geoscience and Remote Sensing Society, at the University of Southern California (USC).
- Attended the Second IADF School on Computer Vision for Earth Observation. IEEE Geoscience and Remote Sensing Society. Oct 3 to Oct 7, 2022. (~12% of the applicants were selected to attend this school).
- Best Oral Presentation Award - 2021 UCR Environmental Sciences Graduate Student Symposium.
- Dissertation Year Program Fellowship, Department of Environmental Sciences, UCR (Fall 2021).
- Hilda and George Liebig Environmental Sciences Summer Fellowship, Department of Environmental Sciences, UCR (2020).
- SCSC-NWRI Fellowship, Southern California Salinity Coalition (SCSC), and the National Water Research Institute (NWRI), 2018-2020.
- Stolzy-Letey Travel Scholarship, Department of Environmental Sciences, UCR (2018-2019).
- Mini GSA Award, Hilda and George Liebig Foundation, Department of Environmental Sciences, UCR (2019, 2021).
- UCANR Drone Camp, June 18-20, 2018, UC San Diego
- Outstanding Thesis Award. Jordan College of Agricultural Sciences & Technology, CSU, Fresno (2017-2018 Academic year).
- Graduate Student Achiever, Department of Plant Science, CSU, Fresno. (2018).
- Ag One-John P. “Phil” Larson Scholarship, CSU, Fresno (Spring 2017).
- Inducted to The Honor Society of Phi Kappa Phi (Spring 2017).

- Jim Pattersen's Ag Science Student Recognition Award - Agriculture Science Student of the Year, 23rd Assembly District, (2017).
- The Gerald O. Mott Meritorious Graduate Student Award in Crop Science, Crop Science Society of America (CSSA), (2017).
- Third place in Poster Competition, Plant and Soil Conference – American Society of Agronomy, California chapter, (2017).
- Jordan Assistantship, Jordan College of Agricultural Sciences and Technology, CSU, Fresno (August 2015-May 2017).
- Graduate Research Fellowship, Graduate Net Initiative, CSU, Fresno (2016-2017).
- Travel grant, Division of Graduate Studies, CSU, Fresno for the 2016 ASA, CSSA, and SSSA Annual Meeting, November 5-9, 2016, in Phoenix, AZ.
- Dean's Scholarship Tuition Waiver, CSU, Fresno (2015- 2016).
- Punjab State Marketing Board Scholarship, PAU, Ludhiana (2011 - 2015).