

Ankush Khandelwal

Denver, Colorado

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Summary

I am an experienced machine learning scientist with a product-focused mindset. I have worked on several multi-disciplinary projects funded by NSF, NASA and DARPA with a proven track record of publications and patents. As a highly independent professional, I have successfully launched machine learning projects driven by customer needs. I value mentorship, and aspire to lead cross-functional teams to deliver real-world impact. Please visit my website to learn more.

Experience

Terra Cover | Co-Founder and CTO

Denver, USA | Jan. 2020 - Present

- Successfully raised \$255K from National Science Foundation SBIR grant for startups (~15 % success rate).
- Established product-market fit for two core products through deep customer engagements and paid pilots.
- Managed ML researchers focusing on semantic segmentation, anomaly detection, and variational inference algorithms to rapidly scale innovative processing of earth observation data on Google Cloud Platform.
- Set up an LLM based pipeline (using OpenAI's API) to achieve 70% reduction in human annotation time to geo-tag news articles for building a catalog of past flood events.

University of Minnesota | Researcher

Minneapolis, USA | May. 2019 - Present

- Leading a project to create the first high-resolution map of Arctic lakes using label-efficient semantic segmentation approaches with the aim to reduce uncertainty in estimation of methane emissions from small lakes.
- Supervised a graduate student to test a novel pre-training strategy for building a foundation model for temporal sequences of satellite imagery.
- Built new techniques for modeling long-term dependencies in time series data using RNNs and Transformers.
- Supervised 3 graduate students on different machine learning projects.
- Co-authored 9 peer reviewed publications.

IBM T.J. Watson Research Center | Research Intern

Yorktown Heights, USA | Jun. 2016 - Aug. 2016

- Contributed to a publication on anomaly detection from multivariate noisy sensor data.
- Implemented key anomaly detection algorithms for IBM's anomaly detection software.

NASA Ames Research Center | Research Intern

Mountain View, USA | Jun. 2015 - Aug. 2015

- Set up the project to study the dependencies of forest ecosystems on climate variables using satellite imagery and weather data.
- Implemented different regression algorithms on NASA's distributed computing environment.

University of Minnesota | Graduate Research Assistant

Minneapolis, USA | Sep. 2012 - May. 2019

- Developed new machine learning algorithms for analyzing satellite imagery at scale.
- Actively participated in cross-disciplinary discussions and launched multiple projects for the lab including urbanization, palm oil plantation mapping, surface water mapping, and crop detection.
- Doctoral Dissertation Award winner for research on mapping global water changes with machine learning.
- Mentored 7 undergraduate students supported by the different grants of Prof. Vipin Kumar.
- Co-authored 18 peer-reviewed publications, 7 patents, and created a state-of-the-art dataset.
- Lead writer of a \$1.43 million NSF grant on advancing deep learning to monitor global land cover change.

Education

University of Minnesota

Minneapolis, USA | 2012 - 2019

PH.D. IN COMPUTER SCIENCE

International Institute of Information Technology, Hyderabad. India

Hyderabad, India | 2006 - 2012

MS BY RESEARCH DUAL DEGREE (B.TECH + MS) IN COMPUTER SCIENCE AND ENGINEERING

Selected Patents

- **Khandelwal, A.**, Karpatne, A. and Kumar, V., University of Minnesota, 2023. Satellite image classification across multiple resolutions and time using ordering constraint among instances. U.S. Patent 11,625,913.
- Kumar, V., Jia, X., **Khandelwal, A.** and Karpatne, A., University of Minnesota, 2021. Discovery of shifting patterns in sequence classification. U.S. Patent 11,037,022.

- Kumar, V., Mithal, V., Nayak, G. and **Khandelwal, A.**, University of Minnesota, 2020. Classification of highly-skewed data. U.S. Patent 10,776,713.

Selected Publications

- Renganathan, A., Ghosh, R., **Khandelwal, A.**, & Kumar, V. (2023). Task Aware Modulation using Representation Learning: An Approach for Few Shot Learning in Heterogeneous Systems. arXiv Preprint arXiv:2310. 04727.
- **Khandelwal, A.**, Karpatne, A., Ravirathinam, P., Ghosh, R., Wei, Z., Dugan, H. A., ... Kumar, V. (2022). ReaLSAT, a global dataset of reservoir and lake surface area variations. Scientific Data, 9(1), 1–12.
- Li, X., **Khandelwal, A.**, Jia, X., Cutler, K., Ghosh, R., Renganathan, A., ... Others. (2022). Regionalization in a global hydrologic deep learning model: from physical descriptors to random vectors. Water Resources Research, 58(8), e2021WR031794.
- Ghosh, R., Ravirathinam, P., Jia, X., **Khandelwal, A.**, Mulla, D. and Kumar, V., 2021, December. Calcrop21: A georeferenced multi-spectral dataset of satellite imagery and crop labels. In 2021 IEEE International Conference on Big Data (Big Data) (pp. 1625-1632). IEEE.
- **Khandelwal, A.**, Xu, S., Li, X., Jia, X., Stienbach, M., Duffy, C., ... Kumar, V. (2020). Physics Guided Machine Learning Methods for Hydrology. arXiv Preprint arXiv:2012. 02854.
- Jia, X., Li, S., **Khandelwal, A.**, Nayak, G., Karpatne, A. and Kumar, V., 2019, May. Spatial context-aware networks for mining temporal discriminative period in land cover detection. In Proceedings of the 2019 SIAM International Conference on Data Mining (pp. 513-521). Society for Industrial and Applied Mathematics.
- Jia, X., **Khandelwal, A.**, Nayak, G., Gerber, J., Carlson, K., West, P., & Kumar, V. (2017a). Incremental Dual-memory LSTM in Land Cover Prediction. Proceedings of the 23rd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 867–876. ACM.
- Mithal, V., Nayak, G., **Khandelwal, A.**, Kumar, V., Oza, N. C., & Nemani, R. (2017). RAPT: Rare Class Prediction in Absence of True Labels. IEEE Transactions on Knowledge and Data Engineering, 29(11), 2484–2497.
- **Khandelwal, A.**, Karpatne, A., Marlier, M. E., Kim, J., Lettenmaier, D. P., & Kumar, V. (2017). An approach for global monitoring of surface water extent variations in reservoirs using MODIS data. Remote Sensing of Environment, 202, 113–128.
- Jia, X., **Khandelwal, A.**, Gerber, J., Carlson, K., West, P., & Kumar, V. (2016). Learning large-scale plantation mapping from imperfect annotators. 2016 IEEE International Conference on Big Data (Big Data), 1192–1201. IEEE.
- Idé, T., **Khandelwal, A.**, & Kalagnanam, J. (2016). Sparse Gaussian Markov Random Field Mixtures for Anomaly Detection. Data Mining (ICDM), 2016 IEEE 16th International Conference On, 955–960. IEEE.
- **Khandelwal, A.**, Mithal, V., & Kumar, V. (2015). Post Classification Label Refinement Using Implicit Ordering Constraint Among Data Instances. Data Mining (ICDM), 2015 IEEE International Conference On, 799–804. IEEE.
- Mithal, V., **Khandelwal, A.**, Boriah, S., Steinhäuser, K., & Kumar, V. (2013). Change detection from temporal sequences of class labels: Application to land cover change mapping. Proceedings of the 2013 SIAM International Conference on Data Mining, 650–658. Society for Industrial and Applied Mathematics.

Synergistic Activities

NSF I-Corps Customer Discovery Bootcamp | Entrepreneurial Lead

Detroit, USA | Sep. 2018 - Oct. 2018

- Conducted 100 interviews with stakeholders in commodity trading, and hydro-power generation market segments.
- Used lean startup methodologies to assess problem-solution fit for satellite imagery processing technology.

Grant Writing

Detroit, USA | Sep. 2018 - Oct. 2018

- *SBIR Phase I: A Physics Guided Machine Learning Framework for Monitoring Rivers using Satellite Imagery.* NSF Small Business Innovation Research Program, \$255,000, Jul 2021 - Dec 2022. **(Principal Investigator)** NSF Grant #2045444.
- *BIGDATA: Advancing Deep Learning to Monitor Global Change.* NSF Translational Impacts Program, \$1.43 million, Nov 2018 - Jul 2023. **(Lead Writer)** NSF Grant #1838159.

Skills

DevOps	Google Cloud Platform, Docker, Git, REST APIs, Databases (SQL, Google Big Query)
Programming	Python, Pytorch, Pyro, Jupyter, Pandas
Geospatial	Google Earth Engine, Geopandas, GDAL, Leaflet, Mapbox, PostgreSQL