

Venkata Shashank Konduri

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EDUCATION

Northeastern University PhD, Interdisciplinary Engineering Dissertation: Understanding the Distribution of Vegetation and its Environmental Drivers using Machine Learning Methods	Boston, MA 2015 - 2021
Indian Institute of Technology Kharagpur Five year dual degree program of B.Tech (Hons.) in Agricultural and Food Engineering and M.Tech in Financial Engineering	Kharagpur, India 2010 - 2015

AWARDS/ACHIEVEMENTS

First place poster presentation among student entries Hydrology section of the American Meteorological Society (AMS) annual meeting	2020
Distinguished Dean's Fellowship College of Engineering, Northeastern University	2015-'16
Graduate student Scholarship Ministry of Human Resource Development, Government of India	2014-'15
Ranked among top 1% of the students , Joint Entrance Examination the most competitive Engineering entrance exam conducted (in Physics, Chemistry and Math) for undergraduate admissions in India	2010

RESEARCH PROJECTS

Topic 1: **Tracking changes in the vegetation structure following fires in the Cerrado biome, Brazil**
Collaborators: Scientists from **NASA's Goddard Space Flight Center, MD & Cardiff University, UK**

- Fire-induced changes in the horizontal and vertical structure of vegetation drive substantial shifts in ecosystem carbon storage, surface energy balance, and species' habitats in the Cerrado biome, Brazil.
- In this study, we use canopy height and canopy cover information derived from ICESat-2 and burned area information from the long time series of MODIS data to estimate post-fire changes in canopy structure for the major vegetation types found in the Cerrado biome.

Topic 2: **Within-season crop identification using semi-supervised machine learning approaches**
Collaborators: Scientists from **Oak Ridge National Laboratory, TN and US Forest Service, NC**
Won the **Best Student Poster award** in the hydrology section, AMS annual meeting, 2020

- Timely and accurate knowledge about the geospatial distribution of crops at national scales is crucial for forecasting crop production and estimating crop water use.
- Developed a MODIS NDVI-based semi-supervised machine learning classifier to enable near-real-time monitoring of crops at continental scales.
- This work involved processing of large geospatiotemporal datasets in an HPC environment.

Topic 3: **Plant community distribution in the Arctic tundra: present and future**
Collaborators: Scientists from **Oak Ridge National Laboratory, TN and University of Alaska, AK**

- This study aims at understanding the current composition, configuration and potential changes in the plant community distribution by mid-century time scales across the Seward Peninsula region of Alaska, USA.

- Using a Random Forest-based environmental niche model, we found that climate drivers such as mean summer temperature as well as microtopographic features such as elevation and downstream distance were strong drivers in determining plant community distribution.

Topic 4: **Using ML approaches to study the impact of mean and extreme weather on crop yield**
 Collaborators: Scientists from **NASA's Ames Research Center/BAERI, CA**

- Private businesses as well as public sector and federal agencies are interested in the predictive understanding of weather impacts on crop yield.
- Employed linear and nonlinear methods for pairwise dependence and regression for improved scientific understanding and enhanced predictive modeling.

PROGRAMMING/SOFTWARE SKILLS

- Experience in handling large spatiotemporal datasets in netCDF/GeoTIFF formats in Python and GRASS GIS and performing various operations like reprojection, affine transformations, raster clipping, masking, resampling etc.
- Proficiency in implementing GRASS commands as shell scripts and executing them on multiple cores of a compute cluster using a scheduler script. I also have experience in running deep learning models inside a container environment over multiple GPUs on an NVIDIA DGX station.
- **Programming:** Python (numpy, pandas, matplotlib, seaborn), bash scripting and R
- **Machine Learning/Deep learning Frameworks:** Keras, Tensorflow, scikit-learn
- **GIS software:** GRASS GIS, QGIS and ArcGIS
- **Version Control:** Git, Mercurial
- **OS:** Linux, Windows

PUBLICATIONS

PEER-REVIEWED JOURNALS

Konduri, V. S., Kumar, J., Hargrove, W., Hoffman, F. M., Ganguly, A. R. Mapping Crops Within the Growing Season Across the United States. *Remote Sensing of Environment*. doi: <https://doi.org/10.1016/j.rse.2020.112048>

Konduri, V. S., Thomas J. Vandal, Sangram Ganguly, and Auroop R. Ganguly. "Data Science for Weather Impacts on Crop Yield." *Frontiers in Sustainable Food Systems (2020)*: 52. doi: <https://doi.org/10.3389/fsufs.2020.00052>

Konduri, V. S., Kumar, J., Hoffman, F. M., Salmon, V. G., Iversen, C. M., Breen, A. L., Hargrove, W. W. and Ganguly A. R. Understanding the Distribution and Drivers of Arctic Tundra Plant Communities. *Manuscript in Preparation*

Konduri, V. S., Morton, D. C. and Andela N. Tracking changes in the vegetation structure following fire in the Cerrado biome using ICESat-2. *Manuscript in Preparation*

PEER-REVIEWED CONFERENCE WORKSHOPS

Konduri, V. S., Kumar, J., Hoffman, F. M., Gouhier T. C., Ganguly, A. R. (2018). Physics-Guided Data Science for Food Security and Climate. *Fragile Earth: Theory Guided Data Science to Enhance Scientific Discovery Workshop*, Knowledge Discovery and Data Mining (KDD) Conference, London, August 2018.

Konduri, V. S., Vandal, T., Ganguly, S., Ganguly, A. (2018). Data Mining for Weather Impacts on Crop Yield. *Fragile Earth: Theory Guided Data Science to Enhance Scientific Discovery Workshop*, Knowledge Discovery and Data Mining (KDD) Conference, London, August 2018.

CONFERENCE PRESENTATIONS

Konduri, V. S., Kumar, J., Hargrove, W., Hoffman, F. M., Ganguly, A. R. (2020). In-Season Crop Mapping for the Continental United States. Poster presentation delivered at the 100th American Meteorological Society

(AMS) Annual Meeting, Boston, MA, January 2020. (**First place poster presentation award**) URL: https://kvshashank.github.io/slides/AMS_2020_poster.pdf

Konduri, V. S., Kumar, J., Hoffman, F. M., Salmon, V. G., Iversen, C. M., Breen, A. L. Hargrove, W. W. (2019). Understanding the Pattern and Drivers of Plant Communities across the Arctic Tundra Landscape. Oral presentation delivered at the American Geophysical Union (AGU), Annual Fall Meeting, San Francisco, CA, December 2019. URL: https://kvshashank.github.io/slides/AGU_Presentation_2019.pdf

Konduri, V. S., Kumar, J., Hargrove, W. W., Hoffman, F. M., Ganguly, A. (2019). Using the Concept of Ecoregions for Large Area Crop Mapping. Oral presentation delivered at the International Association for Landscape Ecology (IALE), Annual Meeting, Fort Collins, CO, April 2019. URL: https://www.climatemodeling.org/~forrest/presentations/Konduri_US-IALE_20190408.pdf

Konduri, V. S., Kumar, J., Hoffman, F. M., Hargrove, W. W. and Ganguly, A. R. (2018), Estimating Crop Acreage over Regional Scale using deep learning. Poster presentation delivered at the American Geophysical Union (AGU), Annual Fall Meeting, Washington D.C., December 2018. URL: https://www.geobabble.org/~hnw/Shashank_AGU_poster_2018.pdf

Konduri, V. S., Kumar, J., Hoffman, F. M., Ganguly, A. R., Hargrove, W. W. (2017). Spatiotemporal Analysis of Corn Phenoregions in the Continental United States. Oral presentation delivered at the American Geophysical Union (AGU), Annual Fall Meeting, New Orleans, LA, December 2017.

CERTIFICATIONS

- **Neural Networks and Deep Learning**, Coursera Aug 2018
- **Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization**, Coursera Aug 2018
- **Introduction to TensorFlow**, Coursera Oct 2018
- **Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning**, Coursera May 2019

FIELD WORK EXPERIENCE

Selected for the **Arctic Alaska Vegetation Field Course** June, 2020
This field course, organized by the University of Alaska Fairbanks, includes 2 days of classroom instruction followed by a 13-day excursion to learn about the vegetation, geology, permafrost, landforms, soils and wildlife of boreal, alpine and arctic environments in the state of Alaska.

Alaska Field Trip July 2019
Was part of a 4-member team that was tasked with collecting observations for various plant and soil properties from field plots spread across the Seward Peninsula, Alaska. This research is being funded by the Next-Generation Ecosystem Experiments (NGEE) **Arctic project of the US Department of Energy (DOE)**.

Internship, Iowa State University May 2013
Collected data for water quantity and quality from subsurface drainage flow monitoring stations at the university-owned field plots. This internship helped enhance understanding of water quality issues in agricultural landscapes and potential best management practices to mitigate water quality problems.

POSITIONS OF RESPONSIBILITY

Teaching Assistant, Fluid Mechanics Spring 2018
Graded assignments and quizzes and held office hours for answering students' queries on the subject.

Student Chair, International Conference on Networked Digital Earth March 2018
In-charge of developing and maintaining the website for the research conference.

Teaching Assistant, Probability and Statistics Fall 2016, Spring 2017
Taught lectures, created study material, designed and graded assignments and conducted tutorial sessions for undergraduate students. Received excellent reviews from students in the anonymous feedback collected at the end of the semester.

Teaching Assistant, Civil and Environmental Engineering (CEE) Spring 2017
Helped in organizing the CEE Distinguished Seminar Series and responsible for the upkeep of the CEE design studio

HOBBIES/INTERESTS

Enjoy doing theatre, hiking, yoga, listening to music and volunteering