

VIJAY LULLA

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SUMMARY

I am an earth scientist with expertise in machine learning, especially in the geospatial domain. I am interested in using my knowledge of research, engineering, and technology to understand, synthesize, and articulate accurately and efficiently socio-technical problems by leveraging infrastructure as a service (IaaS). In addition to visualization, statistical and predictive modeling I am also deeply interested in data governance and ethics generally and geospatial data governance and geoethics more specifically.

INTERESTS/AREAS OF EXPERTISE

- Machine Learning (ML)
- Data Analysis/Munging
- Statistical Modeling
- Visualization
- Unit Testing
- Property-based Testing
- Functional Programming
- Array-oriented programming
- Spatial Databases
- Spatial Modeling (GIS)
- Location-based Analytics (Geoinformatics)
- Land Use Land Cover Classification
- Satellite/Drone Data Processing
- Data Governance
- Data Ethics (Primarily Geoethics)
- Distributed Computing
- Scientific Computing
- Technical Writing
- Presentations

TECHNICAL SKILLS

Machine Learning:	Classification, Regression, Decision Trees, Neural Network, Bayesian Statistics, Gradient Boosting, Monte Carlo Simulation, Agent Based Modeling (ABM)
Programming:	Python (NumPy, SciPy, Pandas, Geopandas, Matplotlib), R (with RCpp), Julia, C/C++, Go, APL/J/K (array-oriented languages), Lua, OCaml
Cloud:	AWS (EC2, Lambda, IAM, S3, VPC, KMS, Redshift, Glue, and RDS)
Databases:	SQL, PostgreSQL, PostGIS, OmniSci (formerly MapD), Amazon Redshift
Infrastructure:	Linux (Debian/Ubuntu), FreeBSD, HPC (Cray Linux Environment), bash shell scripting
GIS/Remote Sensing	Erdas Imagine, ESRI ArcGIS, QGIS, Geoda, Google Earth Engine, MultiSpec
Other Tools:	Jupyter Notebooks, Tableau, Ansible, Docker, HTML/CSS, D3, TeX/LaTeX, Markdown, Zotero; Git, GNU Make

EDUCATION

PhD in Geography (Remote Sensing and GIS)	Aug 2010
Indiana State University	Terre Haute, IN
Master's (MA) in Geography (Remote Sensing and GIS)	Aug 2005
Indiana State University	Terre Haute, IN

EXPERIENCE

Assistant Professor

Aug 2013 – May 2021

Indiana University-Purdue University Indianapolis

Indianapolis, IN

- Remote Sensing/GIS
 - Land use land cover (LULC) classification of remote sensing data
 - Spatial analysis
 - Image preprocessing and image rectification
 - Merge imagery data with GIS data for ecological and socio-economic modeling
 - Created various maps merging GIS and satellite image data
- Data modeling
 - Combine socio-economic census data with satellite imagery data to develop heat risk maps
 - Generated habitat suitability map (HSM) of invertebrates by fusing environmental and meteorological data to be used in statistical models.
 - Used statistical techniques like supervised and unsupervised classification, principal component analysis for statistical modeling (primarily in R).
- Data Analysis
 - Extract Transform Load/Extract Load Transform
 - Consolidated pile of CSV files to generate a unique spatial database (PostgreSQL and PostGIS)
 - Python and R scripts for data munging. Equally comfortable with tabular, or rectangular, and image data.
 - Spun up EC2 virtual machines on AWS to prototype many of these tasks.
 - Exploratory visualization using ggplot2 (R), matplotlib (Python), and Tableau
 - Exploration of Indianapolis Bikeshare trip data (26 million GPS points) from 2014–2018 using GIS, ggplot2, and Tableau.
 - Visualization of ground water well sites using R and PostGIS as part of study of optimal siting of additional wells to address sampling gaps.
 - Intermediate report generation for multiple co-authors/colleagues.
 - Synthesized results to be included in peer reviewed articles and project reports.
- Web development and Databases
 - Created a prototype website using Django web framework for a National Endowment for Humanities funded project.
 - PostgreSQL and PostGIS
 - Created spatial databases for research and teaching.
- Teaching
 - Created a **new** Python and SQL database course. Taught 49 students in 4 years.
 - Taught upper level undergraduate and graduate courses: Intro and advanced remote sensing, Computer Cartography & graphics, Environmental remote sensing, advanced GIS.

Geospatial Analyst**Oct 2012 – Aug 2013***Environmental Solutions & Innovations, Inc.**Cincinnati, OH*

- Data modeling/analysis
 - Created a habitat suitability map (HSM) fusing LULC data with field collected presence absence species data for modeling the habitat of the endangered Indiana Bat for the state of Pennsylvania.
- Data management
 - GIS support for field surveying as a part of environmental permitting.
 - Preprocessing (inputting, cleaning) field collected species presence/absence data.
 - Visualization (ArcGIS, QGIS, and R).
 - Automated, and standardized, storing field survey data in a central searchable database.
 - Consolidated (cleaned, organized, and standardized) via R and shell scripting past field survey data (mostly in Excel files).
 - Created a SQL database (with geospatial capabilities) in order to optimize for use with R, Python and GIS software (QGIS or ArcGIS).

Postdoctoral researcher**Aug 2010 – Dec 2012***Indiana University-Purdue University Indianapolis**Indianapolis, IN*

- Developed an urban heat vulnerability model:
 - Image processing of satellite based remote sensing imagery.
 - Statistical modeling (principal component analysis and neural network) of vulnerability to extreme heat using socio-economic (demographic) and physical factors (derived from satellite imagery).
- Generated faculty evaluation reports (about 400 faculty members) from student surveys.

Research Assistant**Jan 2002 – Aug 2010***Indiana State University**Terre Haute, IN*

- Data management
 - Collected, preprocessed, and analyzed airborne hyperspectral remote sensing data.
- Data analysis
 - Created an algorithm (in Python) to rectify geometric errors in the hyperspectral data
 - Data used for a couple of publications and a couple of doctoral dissertations.
- Technical director for developing interactive instructional CD-ROMs to teach remote sensing and GIS. (2002 – 2005)

AWARDS**The George C. Roberts Award****2020***Indiana University-Purdue University,**Indianapolis, IN.*

- Best paper in MSSJ Volume 22 (2019). [Paper link]

Benjamin J. Moulton Award**2006***Indiana State University,**Terre Haute, IN.*

- Student Award on Best Evidence of Doctoral Research Skills

Outstanding Service Award**2007***Indiana State University,**Terre Haute, IN.*

- Recognition for service to the department of Geography, Geology, and Anthropology.