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, Keras, TensorFlow), R (with RCpp), Julia, C/C++, Go, APL/J/K (array-oriented languages), Lua, JavaScript, OCaml
Cloud:	AWS (EC2, IAM, S3, VPC, and RDS)
Databases:	SQL, PostgreSQL, PostGIS,
Infrastructure:	Linux (Debian/Ubuntu), FreeBSD, HPC (Cray Linux Environment), bash shell scripting
GIS/Remote Sensing	Erdas Imagine, ESRI ArcGIS, QGIS, Google Earth Engine, MultiSpec
Other Tools:	Jupyter Notebooks, 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*

Bachelors of Science (BE) in Electrical Engineering **Jun 2000**
Maharaja Sayajirao University *Gujarat, India*

EXPERIENCE

Assistant Professor **Aug 2013 – present**
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.
  - 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

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.