David Sathiaraj

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Education

Louisiana State University (LSU) Baton Rouge, LA

- Ph.D., School of Electrical Engineering & Computer Science, May 2013
  Research Area: AI, Data Mining, Data Visualization, Big Data Analytics

- **Louisiana State University** Baton Rouge, LA
  M.S., Department of Computer Science, May 2001

- **Louisiana State University** Baton Rouge, LA
  M.S., Department of Industrial Engineering, December 2000

- **Osmania University** Hyderabad, India
  B.E., Department of Mechanical Engineering, June 1998

Work History

Founder and CEO June 2015 - Present

- Pecan Analytics, an AI and Big Data Analytics Startup.
  http://www.pecananalytics.com

  – Developed a fast paced software start-up from the ground-up with patented and patent-pending technologies.

  – Specialize in Water and Environmental Informatics, Political Analytics and Healthcare Informatics.

  – Awarded a startup seed grant by the Louisiana Research and Technology Foundation.

  – Designed and Developed Big Data Systems engineering and Analytical/Quantitative solutions for data-driven political campaigns. In 2014, used the same data analytics in the winning campaign of Senator Bill Cassidy in Louisiana.

  – Developed machine learning algorithms and visual analytics engines for fast mining and analysis of large data sets. http://vis.pecananalytics.com

  – Developed a data-driven enterprise software application platform with automated sensor data collection systems, machine learning algorithms and browser-side analytics and visualization.

Assistant Professor - Research April 2015 - Present
Geography & Anthropology, LSU Baton Rouge, LA
Associate Director, IT August 2013 - Present
NOAA Southern Regional Climate Center Baton Rouge, LA

  – Developed a Big Data, systems engineering program and curriculum focussed on Computational Geosciences, conduct research at the intersection of Computer Science, Climate Informatics and other Big Data Domains.

  – Manage one of 6, national Regional Climate Centers at LSU - 24/7 operational data warehouse for environmental information.

  – Designed and Deployed LSU's first Science DMZ network (https://fasterdata.es.net/science-dmz/)- a 40 Gbps network to transmit Big Data sets and visualization products between LSU and other research partner sites.

- Supervise research and data-driven projects that investigate impacts of Hazardous Weather on Transportation systems (paper submitted and joint project with Transmetric LLC, a transportation firm) and visualization of climate observation data. http://wxtraffic.srcc.lsu.edu
- Developing healthcare analytics solutions and data mining of clinical/healthcare data in research collaboration with Dr. Vinod Dasa, Department of Orthopaedics, LSU Health Sciences Center, New Orleans, LA.
- Lead software developer at the SRCC for the ACIS (Applied Climate Information System) project - a nationwide effort by the six NOAA Regional Climate Centers in US to provide an integrated climate data services and systems. ACIS is a large scale 24/7 data collection and access engine providing data services via APIs to a host of governmental agencies and industry. ACIS is a multi-layer climate data warehouse comprising of numerous climate data sets, metadata and statistical analysis routines. Information about the ACIS software library can also be found here: http://www.rcc-acis.org, http://data.srcc.rcc-acis.org/doc/
- Lead a team of software and systems professionals to develop and establish real-time environmental data delivery engineering systems. http://climdata.srcc.lsu.edu and http://hrly.lsu.edu
- Provide vision and oversight for SRCC's IT infrastructure and climate data products.
- Lead developer for the Southern Climate Impacts Planning Program (SCIPP) http://southernclimate.org/pages/data-tools, one of NOAA's Regional Integrated Sciences and Assessments programs.

- **IT Manager** August 2009 - July 2013
  NOAA Southern Regional Climate Center Baton Rouge, LA
  - Collect, archive, analyze and visualize large climate data sets.
  - Be SRCC's lead in development of climate data products using the ACIS system
  - Lead Developer for SCIPP - developed visualization and data analytic tools for large climate data sets (using Python, Redis, Postgresql, Mongodb and Tornado). Some of the tools developed are hosted here: http://www.climate.gov/decision-support/department/decision-support-tools and http://www.southernclimate.org/data.php.
  - Designed data analytics platform combining hazards data sets such as storm surge, extreme events theory and return frequency analysis (Project collaborations with US Department of Energy, Oak Ridge National Lab and Pacific Northwest National Lab, a SCIPP project, http://surge.srcc.lsu.edu). The storm surge data and predictive analytics platform has also led to interactions with several leading insurance companies that are interested in using the predictions to set rates for clients on the US Gulf Coast.
  - Designed and developed a water reservoir information tool that provides real-time water reservoir levels for reservoirs in the states of TX, LA, OK and NM (a SCIPP project, http://chinook.srcc.lsu.edu/reservoir).
  - Designed and developed parallel computation libraries for generation and visualization of large, gridded climate data sets.
  - Developer of visualization tools for analyzing climate data hazard data sets (such as storm surge, drought, hail, tornadoes, hurricanes, wind) and climate extremes (such as extreme heat and cold conditions, long wet or dry spells). Tools used included Redis and PostGIS.
  - Development of decision support tools for drought planning and understanding historical climate trends.

- Manage a Linux-based super-computing cluster for data analysis and visualization.
- Developer of the Datzilla Project - a data reporting tool for the National Weather Service and National Climatic Data Center (a customization of Bugzilla).
- Developer of map-based and chart-based data analytic tools using spatiotemporal software such as Redis, Mongodb, PostGIS and R.

- **Application Systems Engineer (Research Associate 4)** June 2001 - August 2009
  NOAA Southern Regional Climate Center Baton Rouge, LA
  - Developed data ingest procedures using Python for large climate data sets and streams.
  - Developed client-server tools for ACIS using Python, PostgreSQL, RPC and NetCDF(a scientific data access library). Implemented web applications that extract and provide climate data using tools such as Twisted, Tornado and Python.
  - Developed and deployed web-services and map-based software for Northrop Grumman's (Omaha) decision support systems portal.
  - Developed GIS map-based data analytics software using Javascript, R, Python and Postgis.
  - Developed and maintained parsers for satellite and network based data streams. Data ingest systems were automated, robust and fault-tolerant.
  - Developed pyPloticus - a Python module for the Ploticus graphing library (written in C).
  - Migrated legacy software libraries (based on Fortran and C) from an IRIX environment to Python on a Linux environment.
  - Conducted several tutorials and talks for using the ACIS library and on the use of Python and R in scientific programming.

- **Graduate Assistant - Databases and CAD Programmer** August 1999 - May 2001
  Office of Facility Development Louisiana State University, LA
  - Designed and developed a database that indexed over 3000 facility planning CAD drawings of LSU.
  - Drafted facility plans for mechanical and electrical equipment installations at LSU.

- **Graduate Assistant - Research** August 1998 - May 1999
  Dept. of Industrial Engineering Louisiana State University, LA
  - Formulated a new statistical methodology that evaluated surface-fitting algorithms in-order to reverse engineer freeform surfaces from digitized data. Data analysis conducted using C and SAS.
  - Engineering Design Lab tutor - taught programming on computer-controlled machines.

- **CAD Programmer** November 1998 - August 1999
  Office of Public Safety Louisiana State University, LA
  - Developed the campus map for LSU.

Patents and Publications

- Sathiaraj, D., Huang, X., Robbins, K., Brehe, K, ExtDB - a Climate Extremes Data Set and Visualization Portal. (Submitted, Under Review).
- Sathiaraj, D., Huang, X., Chen, J. Predicting Climate Types For The Continental US Using Unsupervised Clustering Techniques. (Submitted, Under Review)

- Sathiaraj, D., Punkasem, T-o., Wang, F., Seedah, D. Data-Driven Analysis on the Effects of Extreme Weather Elements on Traffic Volume in Atlanta, Georgia. (Submitted, Under Review).
- A Predictive Analytical System And Method, 2017, US Patent Filed.
- Improving Predictive Accuracy In Elections, D. Sathiaraj, WM Cassidy, E Rohli, Big Data, 5(4), 325-336.
- Deriving Data-driven Insights from Climate Extreme Indices for the Continental US, Workshop on Data Mining in Earth System Science, Xinbo Huang, David Sathiaraj, Lei Wang, Barry Keim, International Conference of Data Mining Workshops, 2017, 303-312.
- A Review of Tropical Cyclone-Generated Storm Surges: Global Data Sources, Observations and Impacts, H. F. Needham, B.D. Keim and D. Sathiaraj, Reviews of Geophysics, 2015.
- System, Method And Computer Program Product For Data Mining Applications (Patent Issued: May 13, 2014) - http://www.google.com/patents/US8725663
- On Identifying Critical Nuggets Of Information During Classification Tasks, David Sathiaraj and E. Triantaphyllou, IEEE Transactions on Knowledge and Data Engineering, 2013, 25(6), 1354-1367.
- A Global Database of Tropical Storm Surges, Needham, H.F., B.D. Keim, D. Sathiaraj, and M. Shafer, EOS Transactions, 2013, 94(24), 213-214.
- Spuriously induced precipitation trends in the southeast United States, Jason Allard, Barry D. Keim, Jessica E. Chassereau and David Sathiaraj, Theoretical and Applied Climatology, 2009, 96(1-2), 173-177.
- Partial Duration Series Rainfall Events at El Paso, Texas, Faiers. G. E., B. D. Keim, K. Jammigumpula, D. Sathiaraj, Pennsylvania Geographer, Summer 2005.
- Common parts grouping heuristic: an iterative procedure to cell formation, David Sathiaraj and Bhaba R. Sarker, International Journal of Production Planning and Control, 2002, 13(5), 481-489.

Conferences

- Interactive climate data analytics for hazards mitigation, planning and emergency management, David Sathiaraj, Climate Informatics, 2013.
- Storm Surge Return Periods for the U.S. Gulf Coast, Hal Needham, Barry Keim, David Sathiaraj, Mark Shafer, ATC-SEI Advances in Hurricane Engineering Conference, October 2012.
- Storm Surge Return Periods for the United States Gulf Coast, , Hal Needham, Barry Keim, David Sathiaraj, Mark Shafer, World Environmental and Water Resources Congress in Albuquerque, NM, May 2012.
- Storm Surge Return Periods for the U.S. Gulf Coast, Hal Needham, Barry Keim and David Sathiaraj, AAG Annual Meeting, New York, February 2012.
- Building Climate Date-Driven Information Tools Using Python, David Sathiaraj, Joel James, Yixin Luo and Jinwoong Yoo, 92nd American Meteorological Society (AMS) Annual Meeting, January 2012.
- Creating Custom Tiles For Maps, Louisiana Remote Sensing and GIS Conference (LARSGIS), April 2009, Baton Rouge, LA.

- Spatial Analysis and Visualization of Climate Data Using R, useR 2008, August 2008, University of Dortmund, Germany.
- Applications of Computer-Aided Ergonomics, Annual Symposium, Vasavi College of Engineering, Osmania University, Hyderabad, India, 1996.

Theses

- On Identifying Critical Nuggets Of Information During Classification Tasks, David Sathiaraj, PhD Dissertation, School of Electrical Engineering and Computer Science, LSU, March 2013.
- Evaluation of surface-fitting algorithms for reverse engineering of free-form surfaces, MS Thesis, Department of Industrial Engineering, LSU, October 2000.

Graduate Students Supervision (Thesis supervision)

- Thana-on Punkasem, MS Geography, August 2016 (Graduated)
- Xinbo Huang, MS Geography, December 2016 (Graduated)
- Xinbo Huang, MS Computer Science, May 2017 (Graduated)
- Tri Nguyen, MS Electrical Engineering, August 2017 (Graduated)
- Eric Rohli, MS Engineering Science (ongoing)
- Dineep Thomas, MS Engineering Science (ongoing)

Grants

- STTR Grant with Department of Energy, collaboration with Trabus Technologies, $150,000. April 2018-Dec 2018.
- LIFT^2 grant - Invention to Commercialization grant to develop data science algorithms and visual analytics technologies - ($43,930/year).
- Lakvold Group - Analyze real-estate data and develop data science strategies, Jan 2015-Dec 2016. ($73,496).
- NOAA Southern Regional Climate Center Grant, June 2001-Present (approx. $350,000/year).
- NOAA-RISA Grant, 2008-Present. (approx. $200,000/year for LSU)
- UCAR Equipment Grant, 2010-11 ($7,558).

Technical Skills

Programming Languages: Python, R, Javascript, C, PHP, SQL

Databases: MongoDB, Redis, InfluxDB, PostgreSQL, MySQL, SQL Server, Memcached, PostGIS

Software Libraries: pandas, numpy, scipy, weka, scikit-learn, sqlalchemy, Spark, jQuery, react-native, git

Visualization: d3.js, dc.js, mapbox, highcharts.js, Map-based APIs, GDAL, Spatial libraries in R

Web: Django, Tornado, Twisted, apache, nginx

Deployment: Docker, Chef, Digital Ocean, AWS

Operating Systems: Redhat Linux, Ubuntu, CentOS and Mac OS X

Awards, Honors and Activities

- Louisiana Technology and Research Foundation's, LIFT^2 Grant winner - Fall 2015.
- The 2011 LSU Ellinor H. Behre Prize in Science Writing, The Sigma Xi Research Society (LSU Chapter).
- Phi Kappa Phi.
- NSF Travel Scholarship for R conference, useR 2008 (Dortmund, Germany).

Work Authorization

US Citizen