Dr. Shravan Vudumu, Ph.D.

Technical Manager - Controls and Systems Engineering | Data Analytics, Machine Learning - Georgia Tech

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SUMMARY

Highly motivated and results-oriented academic with a Ph.D. in Mechanical Engineering, complemented by M.S. degrees in Management and Data Analytics. Possessing over fourteen years of experience in engineering leadership, including the development of model-based control algorithms for complex systems and mentoring engineers in data analysis and optimization. Expertise in creating machine learning algorithms for business analytics applications. Seeking to share knowledge by teaching Python programming, data science, machine learning, and business analytics courses part-time as an adjunct faculty for graduate students. No employment sponsorship is required.

EDUCATION

Georgia Institute of Technology, USA   **GPA: 3.7/4.0**
Master of Science in Data Analytics   *Aug 2023 - July 2025*
- Specialization: Business Data Analytics, Machine Learning

University of Illinois, Urbana - Champaign, USA   **GPA: 4.0/4.0**
Master of Science in Management   *Aug 2022 - July 2023*

Missouri University of Science and Technology, USA   **GPA: 4.0/4.0**
Ph.D. Mechanical Engineering   *Aug 2006 - July 2010*

Indian Institute of Technology - Madras, India   **GPA: 8.0/10.0**
M.Tech and B.Tech Mechanical Engineering   *Aug 2001 - May 2006*

WORK EXPERIENCE

Cummins Inc., Columbus, Indiana, USA   Aug 2010 - Present
- Controls, Software and Electronics Engineering - Technical Manager

TEACHING EXPERIENCE

- **Developed, taught and graded graduate engineering courses** while pursuing PhD degree at Missouri S&T.
- **Integrated simulations in engineering curriculum:** GM PACE (General Motors - Partners for Advancement of Collaborative Engineering Education) sponsored project to develop and integrate simulations in graduate courses.

DATA ANALYTICS SKILLS

- **Data Analytics Skills**: wrangling, modeling, machine learning, statistical analysis, optimization, visualization
- **Programming/Software**: R, Python, Power BI, Tableau, SQL, D3 interactive visualization, Git, Excel, Arena

DATA ANALYTICS PROJECTS

- Predictive modeling and anomaly detection of time series using machine learning. | *Python - Anomaly Detection*
- Data analytics of Divvy bikes, a ride sharing system in Chicago. | *R, Python -pandas, geopandas*
- Machine learning algorithms for evaluating credit applications. | *XGBoost, Logistic Regression*
- Stocks and ETFs - statistical analysis and confidence intervals. | *Python - Yahoo finance API*
- Shortest path evaluations in road networks. Ingredient swap recommendations. | *SQL, Python, RegEx*
- Predicting house prices with machine learning. Time series analysis of inflation. | *Python - pandas, numpy*
- Calorie conscious diet planning on budget. Optimizing airport check-in simulations. | *Python - pulp, simpy*
- Non-homogeneous Poisson process simulation of call center. Inventory simulations. | *Arena - statistical analysis*
- Data-driven exploration of superstore sales to uncover insights and forecast trends. | *Python - prophet, Tableau*
- Interactive Data Visualizations - mouseover and mouseout event handling. | *Data Viz.: D3, Python - flask*
- Predicting cognitive decline - integrating machine learning with risk visualization. | *XGBoost, TabPy, Tableau*

CERTIFICATIONS, HONORS AND ACHIEVEMENTS

- As doctoral researcher, **published six international journal and conference papers**.
- Recipient of the prestigious US Department of Transportation's (Research and Innovative Technology Administration) **National University Transportation Center (NUTC) assistantship.**
- Merit scholarship and tuition waiver (2001-06). Member of ASME, SAE, AIAA, IJHE (2009-10).
- Earned **Six Sigma Green Belt** certification (2015). Completed **Systems Engineering** certification.

Course Title: Machine Learning with Python for Business Analytics

Course Description:

This graduate-level course provides a comprehensive introduction to machine learning techniques and their applications in business analytics. Students will gain a strong foundation in fundamental machine learning algorithms, including supervised learning (regression, classification, decision trees), unsupervised learning (clustering), gradient boosting, time series and forecasting algorithms. The course emphasizes hands-on experience with Python and popular libraries (e.g., Pandas, NumPy, Seaborn, Scikit-learn, Statsmodels, Prophet, XGBoost). Students will utilize these tools to develop, train, and evaluate predictive models, perform data analytics, and solve real-world business problems. The group project will provide an opportunity for students to practice skills on a project of their choice.

Target Audience:

This course is designed for graduate students in business analytics, data science, computer science, and related fields. Professionals seeking to enhance skills in machine learning for business applications are also encouraged to enroll.

Course Objectives:

After successful completion of this course, students will be able to:

- Use python programming to perform comprehensive data analysis and visualizations.
- Develop the necessary skills in statistics, confidence intervals, and hypothesis testing.
- Understand the fundamental concepts of machine learning, including supervised, and unsupervised learning.
- Select and implement appropriate machine learning algorithms for various business problems, including forecasting.
- Train, evaluate, and tune machine learning models using Python and relevant libraries.
- Develop predictive models using machine learning techniques and detect anomalies.
- Interpret model results and communicate insights to business stakeholders.

Course Outline:

- **Module 1, Introduction to Machine Learning and Python**
  - What is Machine Learning?
  - Motivational Business Analytics Examples
  - Getting Started with Python programming
  - Data Visualizations with Python
- **Module 2, Descriptive Analytics**
  - Working with Data Frames
  - Handling Missing Values
  - Exploratory Data Analysis
- **Module 3, Probability Distributions and Hypothesis Tests**
  - Distributions and Confidence Intervals
  - Hypothesis Tests and P-Values
  - Analysis of Variance
- **Module 4, Linear Regression**
  - Data Pre-Processing
  - Model Development and Making Predictions
  - Model Diagnostics and Residual Analysis
- **Module 5, Classification:** Logistic Regression, Confusion Matrix
- **Module 6, Decision Trees:** Classification Trees, Regression Trees
- **Module 7, Unsupervised Learning:** K-Means Clustering
- **Module 8, Boosting Algorithms:** XGBoost Boosting Algorithm
- **Module 9, Time Series and Forecasting:** Moving Average Models, Forecasting
- **Module 10, Anomaly Detection:** Predictive Modeling and Anomaly Detection
- **Module 11, Data Analytics Case Studies**
  - Divvy Bikes, a Ride Sharing System
  - Stocks and ETFs - Statistical Analysis and Confidence Intervals
  - Evaluating Loan Applications

Teaching Methodology:

- **Lectures:** Interactive lectures with discussions and Q&A sessions.
- **Hands-on Labs:** Practical exercises using Python on Colab notebooks.
- **Case Studies:** Real-world case studies to apply machine learning techniques to business problems.

Assessment Plan:

- **Homework Assignments:** Weekly assignments to reinforce key concepts and coding skills.
- **Final Project:** A group project to develop and present a machine learning application for a business problem.

Textbook (optional):

- An Introduction to Statistical Learning with Applications in Python by Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani and Jonathan Taylor. Springer, 2023.