Curriculum Vitae

Harsh Anand

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SUMMARY

Over four years of cross-geographical industry experience spanning research lab and consulting. Research experience in computational methods and their applications in energy systems modeling and transportation. Hands-on expertise in modeling complex problems using mathematical programming, statistical analysis, predictive modeling, machine learning, and deep learning.

RESEARCH INTEREST

- *Methodological domains*: machine learning, deep-learning, system modeling and simulation, data-driven decision making, mathematical modeling and optimization
- *Application domains:* energy systems, interdependent infrastructure systems, healthcare, computational sustainability, freight transportation, logistics and supply chains management

EDUCATION

The Pennsylvania State University, USA — *Aug'19 – May'21 (Expected)*
M.S., Data Analytics — *GPA: 4.0/4.0*

Manipal University, India — *May'15*
B.Tech., Information Technology — *GPA: 7.78/10*

RESEARCH EXPERIENCE

Master's Thesis – *Penn State University, PA, USA* — *Jan'20 – Present*

Thesis Title - Energy Infrastructure Resilience and Economic Impacts: Modeling, Data Analytics, and Metrics

- Developed a systematic framework for policy-makers to analyze energy infrastructure resilience by evaluating the economic vulnerability, devising budget allocation strategies to harden the network, and assessing the value of information in decision making under uncertainty. Implemented the systematic framework using network modeling, simulation optimization, and Bayesian statistics.
- Modeled resilience-based power network component's importance under uncertainty by using Bayesian Kernel methods. Integrated the probabilistic assumptions with data-driven methods to enhance the predictability and interpretability of resilience importance measure modeling.

Research Assistant – *Dept. of Systems Engineering, Penn State University, PA, USA* *Nov'19 – Present*

- Implemented a mixed-integer optimization model to analyze the multimodal freight transportation resilience considering economic impacts.
- Researched interactions between patients' inherent temporal and medical patterns to predict the probability of the next stage Alzheimer's Disease progression using non-linear survival methods (such as Non-linear Cox Proportional Hazard Model and Neural Multi-task Logistic Regression).
- Developed mathematical models to study the functioning of the Navy Yard Weather Station on real-time sensor data.

Research Assistant – *Dept. of Information Technology, MIT, Manipal* *2013 – 2015*

Student Researcher – *Manipal Advanced Research Group, MIT, Manipal* *2013 – 2014*

Research Intern – *Indian Institute of Technology (IIT), Guwahati* *Summer 2013*

PUBLICATION & SCHOLARLY WORK

Technical Presentation

- **Anand, H.**, Darayi, M., "Modeling and Analyzing Energy Infrastructure Resilience considering Economic Impact," Technical Presentation in the session *Equilibrium Modeling of the Environmental and Institutional Aspects of Interregional Electricity Trade*, *INFORMS 2020 Annual Meeting*, November 2020

Grant

- Assisted Prof. Mohamad Darayi in drafting a grant proposal that has been submitted to *The Institutes of Energy and the Environment* (IEE)

Working Papers

- **Anand, H.**, Darayi, M., "Modeling and Analyzing Energy Infrastructure Resilience considering Economic Impact," submitted to *Energy Policy*, submitted in November 2020
- **Anand, H.**, Darayi, M., "Power Network Component Vulnerability Analysis: A Machine Learning Approach," abstract accepted at *2021 Complex Adaptive Systems Conference*, full manuscript to be submitted in December 2020
- **Anand, H.**, Darayi, M., "A Probabilistic Approach to Modeling Power Network Component Importance Considering Economic Impacts," abstract submitted to *The Institute of Industrial and Systems Engineers (IISE) Annual Conference & Expo 2021*, full manuscript to be submitted in January 2021
- Sharma, R.[*], **Anand, H.[*]**, Badr, Y., Qiu, R., "Time-to-Event Prediction using Survival Analysis for Alzheimer's Disease Progression," submitted to *International Journal of Medical Informatics*, submitted in November 2020 *([*]Equal contribution)*

Publications

- Saxena, A., **Anand, H.**, Pradhan, T., & Mishra, S. R. (2015). "A Hybrid Chaining Model with AVL and Binary Search Tree to Enhance Search Speed in Hashing." *International Journal of Hybrid Information Technology*, 8(3), 185–194
- Pradhan, T., **Anand, H.**, & Goyal, A. (2014). "THA - A Hybrid Approach for Rule Induction System using Rough Set Theory, Genetic Algorithm and Boolean Algebra." *Global Journal of Researches in Engineering: Numerical Methods*, 14(1), 11

Poster Presentations

- **Anand, H.**, Sharma, R., Mungee, A. (2020). "Projecting Patterns with Causal Influences in a Dynamic Ecosystem for Retail Sales Forecasting," Penn State Poster Competition, Malvern, PA
- Mani, A., **Anand, H.**, Venkat, A. (2020). "A Qualitative Study of Multi-Channel Marketing Campaigns using Market Mix Modeling," Penn State Poster Competition, Malvern, PA
- **Anand, H.** (2020). "Modeling and Analyzing Energy Infrastructure Resilience considering Economic Impact," Penn State Poster Competition, Malvern, PA

PROFESSIONAL EXPERIENCE

Data Science Intern – *Swiss Re, New York, USA* *Jun'20 – Aug'20*

- Designed and automated reinsurance use-case frameworks to explore and estimate statistics, trends, and projections, over 2.2B transactions using Machine learning, PySpark, and Foundry
- Coordinated with multiple stakeholders to institute company-wide standard claims data dictionary to reduce operations time and increase productivity

Senior Data Scientist – *A. T. Kearney, Mumbai, India* *Jan'17 – Aug'19*

- Productized Saudi's first digital platform for K12 school evaluation and market research
- Rolled out customer retention and migration strategy by building a track & trace model using linear and non-linear optimization over 200K customers and 70 products, with a 5% forecasted increase in retention rate
- Led two analysts to automate categorization of transaction line items for spend analytics using machine learning and rules-based categorization approach, building on over 3M transactions across 12 countries and $2B in accountable spend

Machine Learning Engineer – *A.I. Research Lab, TCS, Kochi, India* *Aug'15 – Nov'16*

- Productized time-series forecasting models for analyzing viewing patterns and detecting anomalies in total viewership duration for channels across multiple regions, successively increasing advertisement recommendation by 8%
- Prototyped a supervised learning engine with self-learning capability to generate structured queries based on natural language inputs
- Improved product matching accuracy from 73% to 94% by devising graph-based solution via graph traversal algorithms

Data Science Intern, Semantic Search – *DataWeave Inc., Bangalore, India* *Jan'15 – Jun'15*

- Designed a semantics backbone for a Retail Intelligence Platform to strengthen the backend database by building a large-scale knowledge base of concepts and relationships, including the different product attributes
- Improved clustering performance recall by 30% by creating multiple ontologies to devise a co-occurrence graph

Co-Founder – *Digi Laundry (Previously Digital Dhobi Private Limited), Manipal, India Feb'14 – Oct'16*

HACKATHONS & COMPETITIONS

- Winner – Freestyle O.R. Supreme Case Competition @ 2020 INFORMS *2020*
- Judge and moderator - Smart India Hackathon - Sentiment Analysis of Code-Mixed Languages *2020*
- Best Student Pitch - Lion Cage: Annual competition for early-stage entrepreneurs *2020*
- Placed in top 10% for prototyping Video-To-Text Summarizer - Nittany AI Challenge *2020*
- Runner's Up - Penn State Poster Competition - Retail Sales Forecasting *2020*
- Winner of Wawa - HCL Hackathon**:** Sales forecasting for Wawa using LSTM and Prophet *2019*

HONORS, FELLOWSHIP & AWARDS

- Warren V. Musser Fellowship in Entrepreneurial Studies *2020 – 2021*
- Penn State Chancellor's Scholarship *(Merit Award)* *2019 – 2020*
- AICTE Scholarship *(Tuition Waiver)*, Manipal University *2011 – 2015*
- Guest Speaker - Microsoft AI Engineering Bootcamp *2019*
- Ranked top 1% in 4th International Math Olympiad and 13th National Science Olympiad

- Nominated for 2020-21 Distinguished Master's Thesis Award *(Under review)*

LEADERSHIP & SERVICES

- Student Senator, School of Graduate Professional Studies, Penn State University *2020 – Present*
- Global Programs Senate Committee, Penn State University *2020 – Present*
- Student Council and Curriculum Change Committee, Manipal University *2012 – 2015*
- Class Representative, Manipal University *2012 – 2015*
- Educator for Non-profit, Chala Janjatiya Vikas Sanstha *2009 – 2019*
- Affiliations: INFORMS, Blue and White Society *2019 – Present*

RELEVANT COURSES & CERTIFICATIONS

- Applied Statistics, Deep Learning, Data-Driven Decision Making, Data Mining, Predictive Analytics, Visualization, Applied Research, Data Structures and Algorithms, Supply Chain Management, Lean Six Sigma

TECHNICAL SKILLS

- Python, Java, C++, SQL, Scala, Machine Learning, Deep Learning, Data Mining, Predictive and Prescriptive Modeling, Quantitative Analysis, Decision Analysis, Gurobi, @Risk

OTHER INTERESTS

- Yoga, Art, Reading (non-fiction), Traveling (traveled 18 countries to explore ethnicities, art, and culture), Swimming

REFERENCES

- Prof. Mohamad Darayi, Systems Engineering, Penn State University
- Prof. Youakim Badr, Data Analytics, Penn State University
- Prof. Guanghua Qiu, Information Science, Penn State University
- Prof. Satish M Srinivasan, Information Science, Penn State University
- Prof. Tribikram Pradhan, Information Technology, Manipal University
- Mr. Bharath Thota, Partner - Advanced Analytics, A.T. Kearney
- Dr. R.N. Bhagat, President, Chala Janjatiya Vikas Sanstha – Jharkhand, India