Laxman Bokati

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Research Statement

In many real-life scenarios we often have to make decisions based on incomplete information. My research uses theoretical models for such decision making to explain that seemingly odd behaviors and patterns can have perfectly reasonable mathematical explanations, and shows how the fact that ultimately we need to make decisions explains and improves semi-heuristic methods in machine learning, robotics, geosciences, etc.

Education

The University of Texas at El Paso — El Paso, TX
PhD in Computational Science, GPA: 4.00/4.00 — 2019–2022

- Dissertation: "Decision Making Under Uncertainty With Special Emphasis On Geosciences And Education"

The University of Texas at El Paso — El Paso, TX
M.S. in Computational Science, GPA: 4.00/4.00 — 2017–2019

- Thesis: "Decision Making Under Uncertainty With Applications To Geosciences And Finance"

Institute of Engineering | Tribhuvan University — Kathmandu, Nepal
B.Sc. in Electrical Engineering, GPA: 3.66 — 2008–2012

Experience

Arizona State University — Tempe, Az
Postdoctoral Research Scholar — 2022-Current

- Identified different data sources and developed methods to homogenize new and existing soil data.
- Worked on developing homogenized global soil health, soil carbon and agriculture database.
- Used global soil database to develop data-driven AI/ML models to explain soil health and soil carbon assimilation potential.

The University of Texas at El Paso — El Paso, TX
Teaching Assistant: Computational Science Program & Department of Computer Science — 2017-2022

- Assisted faculty in preparation, teaching, and grading of coursers such as: Calculus I, Calculus II, Calculus III, Matrix Algebra, Introduction to Analysis, Numerical Analysis, Discrete Mathematics, Elementary Statistical Methods, Automata, Computability and Formal Languages, and Multivariate Data Analysis.
- Helped faculty with managing laboratories and with student research projects.
- Tutored Undergraduate students at Math Resource Center for Students.

Aastha Engineering Solution Pvt.Ltd. — Kathmandu, Nepal
Project Engineer — 2013-2016

- Identified potential sites and performed feasibility study of several wind-solar hybrid projects in Nepal, for Alternate Energy Promotion Centre, Nepal.
- Performed a study on Carbon Credit Potential In Industries of Nepal for Ministry of Industry, Nepal.
- Helped the innovator to promote "Matribhumi Improved Cooking Stove."

- Helped the innovator to promote "Low Energy Solar Water Pump."
- Managed designing temporary shelter buildings ("Aashrya") in several earthquake-affected districts.
- I prepared proposals, assisted in management of resources and manpower, and prepared final reports for projects mentioned.
- Represented Aastha in various workshop/training programs.
- Assisted in survey, development, promotion, dissemination of various renewable energy projects.
- Assisted in Supervision of the field visits, and information collection.

Research Book/Chapters

- Laxman Bokati and Vladik Kreinovich, **"Decision Making Under Uncertainty, with a Special Emphasis on Geosciences and Education"**, *Springer Verlag, Cham*, Switzerland, 2023, to appear
- Vladik Kreinovich, Olga Kosheleva, and Laxman Bokati, **"How to Make Sure That Robot's Behavior Is Human-Like"**, *In: Bin Wei (ed.), Brain and Cognitive Intelligence – Control in Robotics*, CRC Press, Boca Raton, Florida, 2022, pp. 70-80.
- Laxman Bokati, Vladik Kreinovich, and Chon Van Le, **"How to Explain the Anchoring Formula in Behavioral Economics"**, *In: Nguyen Ngoc Thach, Doan Thanh Ha, Nguyen Duc Trung, and Vladik Kreinovich (eds.), Prediction and Causality in Econometrics and Related Topics*, Springer, Cham, Switzerland, 2022, pp. 28-34.
- Laxman Bokati, Vladik Kreinovich, and Doan Thanh Ha, **"How the Proportion of People Who Agree to Perform a Task Depends on the Stimulus: A Theoretical Explanation of the Empirical Formula"**, *In: Nguyen Ngoc Thach, Doan Thanh Ha, Nguyen Duc Trung, and Vladik Kreinovich (eds.), Prediction and Causality in Econometrics and Related Topics*, Springer, Cham, Switzerland, 2022, pp. 22-27.
- Laxman Bokati, Aaron Velasco, and Vladik Kreinovich, **"Absence of Remotely Triggered Large Earthquakes: A Geometric Explanation"**, *In: Martine Ceberio and Vladik Kreinovich (eds.) How Uncertainty-Related Ideas Can Provide Theoretical Explanation for Empirical Dependencies*, Springer, Cham, Switzerland, 2021, pp. 37-41.
- Laxman Bokati, Olga Kosheleva, and Vladik Kreinovich, **"How Can We Explain Different Number Systems?"**, *In: Martine Ceberio and Vladik Kreinovich (eds.), How Uncertainty-Related Ideas Can Provide Theoretical Explanation for Empirical Dependencies*, Springer, Cham, Switzerland, 2021, pp. 21-26.
- Laxman Bokati, Julio Urenda, Olga Kosheleva, and Vladik Kreinovich, **"Why Immediate Repetition Is Good for Short-Term Learning Results but Bad For Long-Term Learning: Explanation Based on Decision Theory"**, *In: Martine Ceberio and Vladik Kreinovich (eds.), How Uncertainty-Related Ideas Can Provide Theoretical Explanation for Empirical Dependencies*, Springer, Cham, Switzerland, 2021, pp. 27-35.
- Laxman Bokati, Aaron Velasco, and Vladik Kreinovich, **"Why Gamma Distribution of Seismic Inter-Event Times: A Theoretical Explanation"**, *In: Martine Ceberio and Vladik Kreinovich (eds.), How Uncertainty-Related Ideas Can Provide Theoretical Explanation for Empirical Dependencies*, Springer, Cham, Switzerland, 2021, pp. 43-50.
- Vladik Kreinovich, Olga Kosheleva, and Laxman Bokati, **"We Need Fuzzy Techniques to Design Successful Human-Like Robots"**, *In: Cengiz Kahraman and Eda Bolturk (Eds.), Toward Humanoid Robots: The Role of Fuzzy Sets*, Springer, Cham, Switzerland, 2021, pp. 121-131.

Journal Articles

- Laxman Bokati, Olga Kosheleva, and Vladik Kreinovich, **"Why Significant Wave Height And Rogue Waves Are So Defined: A Possible Explanation"**, *Mathematical Structures and Modeling*, 2021, Vol. 57, pp. 96-100.
- Laxman Bokati, Julio Urenda, Olga Kosheleva, and Vladik Kreinovich, **"Why Do We Need Two Doses of Covid-19 Vaccine : A Qualitative Explanation"**, *Applied Mathematical Sciences*, 2021, Vol. 15, No. 3, pp. 131-136.
- Laxman Bokati, Vladik Kreinovich, and Jordan Katz, **"Why 7 Plus Minus 2? A Possible Geometric Explanation"**,*Geombinatorics*, 2021, Vol. 30, No. 1, pp. 109-112.

- Hoang Phuong Nguyen, Laxman Bokati, Vladik Kreinovich **"A New (Simplified) Derivation of Nash's Bargaining Solution"**, *Journal of Advanced Computational Intelligence and Intelligent Informatics (JACIII)*, 2020, Vol. 24, No. 5, pp. 589-592.
- Laxman Bokati, Hoang Phuong Nguyen, Olga Kosheleva, and Vladik Kreinovich, **"How to Combine (Dis)Utilities of Different Aspects into a Single (Dis)Utility Value, and How This Is Related to Geometric Images of Happiness"**, *Journal of Advanced Computational Intelligence and Intelligent Informatics (JACIII)* , 2020, Vol. 24, No. 5, pp. 599-603.
- Laxman Bokati, Olga Kosheleva, and Vladik Kreinovich, **"The Similarity Between Earth's and Mars's Core-Mantle Boundary Seems to Be Statistically Significant"**, *Applied Mathematical Sciences*, 2020, Vol. 14, No. 15, pp. 711-715.
- Laxman Bokati, Olga Kosheleva, and Vladik Kreinovich, **"Why 3D Fragmentation Usually Leads to Cuboids: A Simple Geometric Explanation"**, *International Mathematical Forum*, 2020, Vol. 15, No. 6, pp. 277-281.
- Olga Kosheleva, Laxman Bokati, and Vladik Kreinovich, **"Why Mean, Variance, Moments, Correlation, Skewness etc. – Invariance-Based Explanations"**, *Asian Journal of Economics and Banking* , 2020, Vol. 4, No. 2, pp. 61-76.
- Laxman Bokati, Olga Kosheleva, and Vladik Kreinovich, **"Predictably (Boundedly) Rational: Examples of Seemingly Irrational Behavior Can Be Quantitatively Explained by Bounded Rationality"**, *Asian Journal of Economics and Banking*, 2020, Vol. 4, No. 1, pp. 20–48.
- Laxman Bokati, Vyacheslav V. Kalashnikov, Nataliya Kalashnykova, Olga Kosheleva, and Vladik Kreinovich, **"How to Assign Grades to Tasks so as to Maximize Student Efforts"**, *Russian Digital Libraries Journal*, 2019, Vol. 22, No. 6, pp. 773-779.
- Bibek Aryal, Laxman Bokati, Karla Godinez, Shammir Ibarra, Heyi Liu, Bofei Wang, and Vladik Kreinovich, **"Common Sense Addition Explained by Hurwicz Optimism-Pessimism Criterion"**, *Journal of Uncertain Systems*, 2019, Vol. 13, No. 3, pp. 172-175.
- Laxman Bokati, Olga Kosheleva, and Vladik Kreinovich, **"When Revolutions Succeed? 80/20 Rule and 7 Plus Minus 2 Law Explain the 3.5 % Rule"**, *Journal of Uncertain Systems*, 2019, Vol. 13, No. 3, pp. 186-188.
- Laxman Bokati and Vladik Kreinovich, **"Decision theory can explain why buying and selling prices are different"**, *Journal of Uncertain Systems*, 2019, Vol. 13, No. 3, pp. 189-192.
- Laxman Bokati, Richard Alfaro, Aaron Velasco, and Vladik Kreinovich, **"Dynamic Triggering of Earthquakes: Symmetry-Based Geometric Analysis"**, *Geombinatorics* , 2019, Vol. 29, No. 2, pp. 78-88.
- Laxman Bokati and Vladik Kreinovich, **"Maximum Entropy Approach to Portfolio Optimization: Economic Justification of an Intuitive Diversity Idea"**, *Asian Journal of Economics and Banking*, 2019, Vol. 3, No. 2, pp. 17-28.
- Laxman Bokati, Olga Kosheleva, and Vladik Kreinovich, **"How to generate 'nice' cubic polynomials – with rational coefficients, rational zeros and rational extrema : a fast algorithm"**, *Journal of Uncertain Systems*, 2019, Vol. 13, No. 2, pp. 94-99.
- Laxman Bokati and Vladik Kreinovich, **"Decision theory explains 'Telescoping Effect' – that our time perception is biased"**, *Journal of Uncertain Systems*, 2019, Vol. 13, No. 2, pp. 100-103.
- Thach Ngoc Nguyen, Laxman Bokati, Aaron Velasco, and Vladik Kreinovich, **"Bhutan Landscape Anomaly: Possible Effect on Himalayan Economy (In View of Optimal Description of Elevation Profiles)"**, *Thai Journal of Mathematics, Special issue Structural Change Modeling and Optimization in Econometrics*, 2019, pp. 57-69.
- Laxman Bokati and Vladik Kreinovich, **"Is 'No Trade Theorem' Really a Paradox: Analysis Based on Decision Theory"**, *Applied Mathematical Sciences*, 2019, Vol. 13, No. 8, pp. 397-404.

Conference Papers

- Laxman Bokati, Olga Kosheleva, and Vladik Kreinovich, **"How to elicit complex-valued fuzzy degrees"**, *Proceedings of the 2022 Annual Conference of North American Fuzzy Information Processing Society*, Halifax, Nova Scotia, Canada, May 31 - June 3, 2022.

- Laxman Bokati, Olga Kosheleva, and Vladik Kreinovich, **"How Much For a Set: General Case of Decision Making Under Set-Valued Uncertainty"**, *In: Julia Rayz, Victor Raskin, Scott Dick, and Vladik Kreinovich (eds.), "Explainable AI and Other Applications of Fuzzy Techniques, Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS 2021"*, West Lafayette, Indiana, June 7-9, 2021, Springer, Cham, Switzerland, 2022, pp. 400-405.
- Kelly Cohen, Laxman Bokati, Martine Ceberio, Olga Kosheleva, and Vladik Kreinovich, **"Why Fuzzy Techniques in Explainable AI? Which Fuzzy Techniques in Explainable AI?"**, *In: Julia Rayz, Victor Raskin, Scott Dick, and Vladik Kreinovich (eds.), "Explainable AI and Other Applications of Fuzzy Techniques, Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2021, West Lafayette, Indiana, June 7-9, 2021", Springer, Cham, Switzerland, 2022, pp. 74-78.*
- Laxman Bokati, Aaron Velasco, and Vladik Kreinovich, **"Scale-Invariance and Fuzzy Techniques Explain the Empirical Success of Inverse Distance Weighting and of Dual Inverse Distance Weighting in Geosciences"**, *Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2020*, Redmond, Washington, August 20–22, 2020.
- Laxman Bokati, Olga Kosheleva, and Vladik Kreinovich, **"It Is Important to Take All Available Information into Account When Making a Decision: Case of the Two Envelopes Problem"**, *Proceedings of the 4th International Conference on Intelligent Decision Science IDS'2020* , Istanbul, Turkey, August 7-8, 2020.
- Laxman Bokati, Olga Kosheleva, Vladik Kreinovich, and Anibal Sosa, **"Why Deep Learning Is More Efficient than Support Vector Machines, and How It Is Related to Sparsity Techniques in Signal Processing"**, *Proceedings of the 2020 4th International Conference on Intelligent Systems, Metaheuristics Swarm Intelligence ISMSI'2020*, Thimpu, Bhutan, April 18-19, 2020.
- Oscar Galindo, Laxman Bokati, and Vladik Kreinovich, **"Towards a More Efficient Representation of Functions in Quantum and Reversible Computing"**, *Proceedings of the Joint 11th Conference of the European Society for Fuzzy Logic and Technology EUSFLAT'2019 and International Quantum Systems Association (IQSA) Workshop on Quantum Structures*, Prague, Czech Republic, September 9–13, 2019.
- Bartlomiej Jacek Kubica, Laxman Bokati, Olga Kosheleva, and Vladik Kreinovich, **"Softmax and McFadden's Discrete Choice under Interval (and Other) Uncertainty"**, *In: Roman Wyrzykowski, Ewa Deelman, Jack Dongarra, and Konrad Karczewski (eds.), Proceedings of the International Conference on Parallel Processing and Applied Mathematics PPAM'2019*, Bialystok, Poland, September 8-11, 2019, Springer, 2020, Vol. II, pp. 364-373.

Posters/Presentations

- **How We Humans Fuse Different Types of Uncertainty when Making Decisions** at Data and Information Fusion Conference DIF, Santa Fe, New Mexico, August 20-22, 2019.
- **How to Generate "Nice" Cubic Polynomials – with Rational Coefficients, Rational Zeros and Rational Extrema: A Fast Algorithm** at 2019 Southwest Local Algebra Meeting (SLAM), El Paso, Texas, February 23-24, 2019.
- **Common Sense Addition Explained by Hurwicz Optimism-Pessimism Criterion** at 23rd Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences, El Paso, Texas, November 3, 2018.

Skills

- **Data analysis, Visualization and Modeling in Python/Google-Colab/Jupyter Notebook**
- **Programming:** Python, R, MATLAB, C
- **Technical Writing:** Article, Proposal, Report, Poster, Presentation
- **Computer Basics:** LaTeX, Microsoft Office Word, PowerPoint, Excel
- **Languages:** English, Hindi, Nepali

Awards

- **Academic and Research Excellence** *Precommencent Awards College of Science* **"University of Texas at El Paso"** –2022
- **Outstanding Paper Award** *Annual Conference of North American Fuzzy Information Processing Society NAFIPS'22*, Halifax, Nova Scotia, Canada for **"How to elicit complex-valued fuzzy degrees"** –2022
- **Best Student Paper Award Interval Session** *Annual Conference of the NorthAmerican Fuzzy Information Society NAFIPS'21*, for **"How Much For a Set: General Case of Decision Making Under Set-Valued Uncertainty"** –2021

References

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- Dr. Ming-Ying Leung
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- Dr. Michael Pokojovy
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  Computational Science Program
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  Resource Sciences
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