Kshitij Goyal

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Experience

KU Leuven
Sep 2018 - Present

PhD in Machine Learning and Artificial Intelligence

Thesis: Verifying Learning Artificial Intelligence Systems.
• Primary focus on learning machine learning models with domain based constraints (e.g., safety constraints in autonomous vehicles).
• Proposed a novel approach, called Satisfiability Descent (SaDe), to learn parametric models that satisfy domain constraints by combining concepts of gradient descent with satisfiability.
• Currently working on extending SaDe to deep neural networks.

Other Projects:

1. Feature Interactions in XGBoost.
• Learned interactions between features using mutual information between features.
• Demonstrated that identified interactions can help improve the performance of XGBoost models.

2. Industry Collaboration: Identifying Product Concepts with Only Positive Examples (Use Case: Tunify).
• Presented a novel approach to identify product concepts (e.g., product categories in e-commerce, public playlists in music streaming services) automatically with only small amounts of positive examples, by combining ideas of clustering and decision trees.
• Demonstrated the viability of our approach using a real world use case of a music streaming service, Tunify**.**

Student Thesis Projects:
1. *Machine learning in Shapley Space:* Demonstrated that clustering in the Shapley space leads to better quality clusters.
2. *Personalised Search with Deep Learning:* Used VAE and LDA as encodings to learn personalised search models that outperform the baselines.
3. *CeGL:* A counter example guided approach to learn models that satisfy domain constraints in neural networks.

Zynga Games
May 2017 - August 2017

Data Analyst
• Worked as a data analyst for multiple mobile games.
• Analysed key performance metrics to provide insights on the business strategies.

Accenture Services Pvt. Limited
May 2014 - March 2017

Business Analyst
• Inventory optimisation for European Telecom Company.
• Reliability Analysis for an automotive manufacturer.
• Social media analytics in demand planning.

Media iQ Digital May 2013 - July 2013	**Business Intern** • Developed an algorithm using simple heuristics to forecast maximum number of impressions won. • Analysed twitter stream data in python to obtain the sentiments of people for a carrier airline

Education

KU Leuven Sep 2017 - August 2018	**Master of Engineering in Computer Science (Artificial Intelligence)** Graduated Magna Cum Laude. **Thesis**: Personalised Search with Deep Learning.
Indian Institute of Technology, Kanpur June 2009 - May 2014	**Integrated Masters in Mathematics and Scientific Computing** **Thesis**: Analysis of Middle Censored data to estimate the lifetime distribution function.

Publications

Peer reviewed conference publications	SaDe: Learning Models that Provably Satisfy Domain Constraints **K. Goyal**, S. Dumancic, H. Blockeel ECMLPKDD 2022 Automatic Generation of Product Concepts With Only Positive Examples **K. Goyal**, W. Meert, H. Blockeel BNAIC 2022 (Under Review)
Peer reviewed workshop publications	Feature Interactions in XGBoost **K. Goyal**, S. Dumancic, H. Blockeel. AIMLAI-XKDD Workshop @ECML 2019

Technical skills

Data Science	Machine Learning, Constraints in Machine Learning, Satisfiability (SAT), Satisfiability Modulo Theories (SMT), Tree Ensembles, Optimal Decision Trees, Natural Language Processing, Music Streaming Analysis, Neural Networks, Game Theory in Machine Learning.
Software Development	Expert Python Programmer. Proficient with libraries such as Scikit-learn, Pandas, Numpy and Matplotlib, tools such as Jupiter Notebooks. Moderate experience with Java, R, SQL, z3 etc.