Kshitij Goyal

PhD Researcher in Machine Learning

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Education

MSc in Artificial Intelligence, KU Leuven *(graduated magna cum laude)* *Sep'2017 - Sep'2018*
Master thesis: Proposed and implemented a variant of the classic RankNet approach of ranking documents which personalises the results based on user profiles.

MSc (Integrated) in Mathematics, IIT Kanpur, India *June 2009 - May 2014*
Master thesis: Analysis of middle censored data under a shifted exponential distribution

Professional Experience

PhD Researcher @ DTAI lab, KU Leuven, Belgium *Oct'2018- present*
Topic: Machine Learning with Constraints: Towards Trustworthy AI; *Advisor*: Prof. Hendrik Blockeel

Learning Models that Provably Satisfy Domain Constraint *(primary goal of the thesis)*	• Developed a new framework and an optimisation algorithm to learn models that can **guarantee domain constraint satisfaction** (e.g., safety constraints, fairness constraints) for all possible predictions. • Evaluation on various regression, classification and structured prediction tasks demonstrated that our approach, in contrast to existing approaches like regularization, is able to guarantee domain constraint satisfaction.
Music Playlist Generation *(awarded the best paper at BNAIC'22)*	• Working with industry partner *Tunify*, developed and implemented an approach that combines rule based classification with **PU learning** to automatically **identify music playlists.** • Proposed a **clustering** based approach to identify new playlists from customer data, leading to an identification of more than **50 new playlists** previously unidentified by the domain experts.
Iteratively Improving Tree Performance by Optimising Subtrees	• Proposed and implemented an approach to improve the performance of an already learned tree by **optimising sub-trees** iteratively. • Demonstrated that the proposed approach improves the performance of CART and lookahead trees to close to optimal levels, while being **tractable for deep trees**.

Business Analyst - Zynga Games, Bangalore, India *April - Sep'2017*
Analysed key performance metrics for multiple mobile games to provide insights for business strategies in addition to developing an in-house tool to perform A/B tests on newly rolled updates.

Business Analyst - Accenture Management Consulting, Bangalore, India *June 2014 - Mar'2017*
Collaborated with multiple teams across the globe to provide business consulting services to clients in the fields of inventory optimisation, reliability management systems, social media analytics.

Data Analyst Internship - Media iQ Digital, Bangalore, India *May - July 2013*
Developed forecasting models to predict digital impressions won by an airline carrier for a given bid.

Technical and Language Skills

General Skills	Programming	Python Data Science Stack	Languages
Machine Learning, Data Mining, Logic and Satisfiability, Combinatorial Optimisation, Computer Vision	Python, R, Java, SQL	**ML:** Scikit-learn, numpy, pandas, pytorch **Visualisation:** matplotlib, seaborn, altair **Parallelisation:** scoop, dask	English (full professional proficiency) Hindi (native proficiency)

Publications

1. SaDe: Learning Models that Provably Satisfy Domain Constraints. (pdf) *ECML 2022*
   K. Goyal, S. Dumancic, H Blockeel
2. Automatic Generation of Product Concepts from Positive Examples. (pdf) *BNAIC 2022*
   K. Goyal, W. Meert, H Blockeel, E. V. Wolputte, K. Vanderstraeten, W. Pijpops, K. Jaspers
3. Feature Interactions in XGBoost. (pdf) *AIMLAI-ECML 2019*
   K. Goyal, S. Dumancic, H Blockeel
4. DeepSaDe: Learning Neural Networks that Guarantee Domain Constraint Satisfaction (pdf) *(under review)*
   K. Goyal, S. Dumancic, H Blockeel

Leadership & Awards

- Teaching assistant for three courses: taught exercise sessions and prepared assignments *2018 - 2022*
- Thesis advisor to 5 master students: projects in areas of **personalised search**, **music streaming, game theory & constrained learning** *2018 - 2022*
- Department representative for the thesis administration for MSc Computer Science at KU Leuven *2019 - 2022*
- Research paper **reviewer** for ECML'19 and ECML'22
- Received the **best paper award** at BNAIC'22
- Awarded **2nd prize** at the KU Leuven Datathon *2017 - 2018*
- Awarded the prestigious **INSPIRE** undergraduate scholarship by the government of India *2009 - 2014*