

## Experience

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### PhD Researcher @ DTAI Machine Learning group, KU Leuven

Oct' 2018- present

**Thesis Topic:** Machine Learning for Verifiable Artificial Intelligence**Publications/Projects:**

- SaDe: Learning Models that Provably Satisfy Domain Constraints (ECMLPKDD - 2022)  
Developed and implemented a new framework and optimisation algorithm for enforcing domain constraints (i.e., safety constraints) in machine learning models. In contrast to existing approaches, our method is able to certify that a constraint is satisfied by the predictions of the model on all possible inputs. ([PDF](#))([Code](#))
- DeepSaDe: Towards Satisfying Domain Constraints in Neural Networks (Ongoing)  
Developing a solution to enforce domain constraints with satisfaction guarantees on neural networks. The parameters of the last layer are learned in a satisfiability framework in conjunction with the standard gradient descent. We also propose a bound propagation algorithm to propagate domain constraints across the network.
- Automatic Generation of Product Concepts With Only Positive Examples (under review) (BNAIC - 2022)  
Proposed a novel approach to identify and learn dynamic product concepts (e.g., product categories on e-commerce websites, public playlists on music streaming services) using only positive examples. Evaluated this approach for a music streaming service to effectively identify new dynamic public playlists from a collection of user defined playlists.
- Feature Interactions in XGBoost (AIMLAI workshop @ECMLPKDD - 2019)  
Conceptualised an approach to use the feature interactions from the data, calculated using mutual information, as constraints in the existing XGBoost framework to improve the predictive performance. ([PDF](#))

### Zynga Games, Bangalore, India - Business Analyst

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.

### Accenture Management Consulting, Bangalore, India - Business Analyst

June 2014 - Mar' 2017

**Projects:**

- As part of a team, developed fraud detection techniques for a reliability management system for an automotive giant to reduce post-sale expenses. Proposed approach resulted in a projected reduction in warranty spend by \$249 over the course of 4 years.
- Optimised stock levels at central warehouses across multiple locations for a European telecom giant. Proposed a rebalancing solution between locations to optimise the value stock that led to an improvement of 9% in the total stock value.

## Education

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### Master (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.

### Master (Integrated MSc) in Mathematics and Scientific Computing, IIT Kanpur, India

June' 2009 - May' 2014

**Master thesis:** Analysis of middle censored data under a shifted exponential distribution

## Technical Skills

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Programming Languages:

Python, SQL, Java, R

General:

Machine Learning, Satisfiability and Logic, Optimisation

Language Skills:

English, Hindi (native speaker)

## Leadership & Awards

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- Teaching assistant for courses: Informatics (Fall 2019, Fall 2020) and Scripting Languages (Fall 2021), and the master's thesis advisor to 6 students between 2018-2022
- Department representative for the master thesis administration for master in computer science at KU Leuven
- Research paper reviewer for ECMLPKDD 2019 and 2022
- Awarded 2<sup>nd</sup> prize at the KU Leuven datathon 2018
- Participated in the DeepLearn Summer School, Gran Canaria, 2022