

# Sagar Malhotra

Fondazione Bruno Kessler  
Via Sommarive, 18  
Trento, Trentino 38123 Italy  
Phone: +39 320 841 2396  
email: [sagar.malhotra@unitn.it](mailto:sagar.malhotra@unitn.it)

url: [countinglogic.github.io](https://countinglogic.github.io)

Born: May 6, 1994  
Nationality: Indian

## Current position

11.2019-01.2023 PhD Candidate  
Advisor: Luciano Serafini  
Project: Analytical Approaches to Lifted Inference<sup>1</sup>  
University of Trento, Italy  
Fondazione Bruno Kessler, Italy

## Research Experience and Education

2018-2019 Junior Research Fellow  
Advisors: Luciano Serafini, Radim Nedbal  
Project: Variational Inference in Hybrid Domains  
Data and Knowledge Management Unit  
Fondazione Bruno Kessler, Italy

2018-2015 MSc in Physics  
Advisors: Roberto Iuppa (Unitn), Marco Cristoforetti (FBK)  
Thesis: Deep Learning For Track Reconstruction in Next Generation HEP Experiments  
Fondazione Bruno Kessler, Italy  
University of Trento, Italy

2015-2012 BSc in Physics with Honors  
University of Delhi, India

## Research Interests

My current research interests revolve around knowledge representation and reasoning under uncertainty. I am especially interested in:

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<sup>1</sup>Tentative title

- Exact and Approximate Probabilistic Inference
- Consistency of Probabilistic Inference
- Weighted Model Counting
- Structure Learning
- Exponential Random Graphs and their extension to logical domains
- Asymptotic Inference

## Publications

- 2022 Alessandro Daniele, Tommaso Campari, **Sagar Malhotra** and Luciano Serafini.  
Deep Symbolic Networks: Discovering Symbols and Symbolic Knowledge from Perception  
*Under Review*
- 2022 **Sagar Malhotra** and Luciano Serafini. On Projectivity in Markov Logic Networks  
*Proceedings of Machine Learning and Knowledge Discovery in Databases. Research Track - European Conference, ECML PKDD 2022.*  
[arXiv:2204.04009](#)
- 2022 **Sagar Malhotra** and Luciano Serafini. Weighted Model Counting in  $FO^2$  with Cardinality Constraints and Counting Quantifiers: A Closed Form Formula  
(Oral presentation) *Proceedings of the 36<sup>th</sup> AAAI Conference on Artificial Intelligence.*  
[AAAI 2022](#)
- 2021 **Sagar Malhotra** and Luciano Serafini. A Combinatorial Approach to Weighted Model Counting in the Two Variable Fragment with Cardinality Constraints  
*Proceedings of the 20<sup>th</sup> International Conference of the Italian Association for Artificial Intelligence*  
[AlxIA 2021](#)

## Workshop Publications

- 2022 **Sagar Malhotra** and Luciano Serafini. On Projectivity in Markov Logic Networks  
*9<sup>th</sup> International Workshop on Probabilistic Logic Programming, 2022*  
[PLP 2022:Preprint](#)
- 2021 **Sagar Malhotra** and Luciano Serafini. Weighted Model Counting in  $FO^2$  with Cardinality Constraints and Counting Quantifiers: A Closed Form Formula  
*10<sup>th</sup> International Workshop on Statistical Relational AI, 2021*  
[StarAI 2021](#)

## Talks and Tutorials

- 2022 On Probabilistic Inference in Logical Domains  
*Invited Speaker at the Institute of Informatics, Ludwig Maximilian University of Munich, Germany*
- 2022 A Tutorial on Probabilistic Inference in Logical Domains, University of Padova, Italy
- 2022 Weighted First-Order Model Counting, DocInProgress, University of Trento, Italy
- 2022 On Projectivity in Markov Logic Networks, DKM Group Seminar
- 2022 Weighted First-Order Model Counting, AAAI 2022@FBK Workshop

## Programming Skills

Fluent: Python, Pandas,  $\text{\LaTeX}$

Familiar: Mathematica, R, Pytorch, HTML

## Reviewing and PC Experience

PC Member at AAAI 2022, Sub-Reviewer at KR 2021

## Awards and Achievements

- 2017 Part of the winning team in Industrial Problem Solving using Physics ([IPSP 2017](#))
- 2017 Awarded fully funded trip to Innovation Days-Innsbruck in StartUp Lab, Trento
- 2016 Awarded full Scholarship for the Joint Masters in Theoretical Physics at University of Trento and SISSA- Trieste (Declined)
- 2016 Awarded Opera Universitaria Scholarship for Masters in Physics at University of Trento
- 2016 Amongst top 5% candidates in the Joint Entrance Screening Test- Physics 2016 among ~ 5000 candidates
- 2016 Amongst top 5 % candidates in IIT Joint Admission Test for Masters in Physics 2016 among ~ 10000 candidates

## References

Luciano Serafini  
Fondazione Bruno Kessler, Trento, Italy  
Email: [serafini@fbk.eu](mailto:serafini@fbk.eu)

Dr. Felix Weitkämper  
Institute of Informatics, LMU, Munich, Germany  
Email: [felix.weitkaemper@lmu.de](mailto:felix.weitkaemper@lmu.de)

Dr. Mauro Dragoni  
Fondazione Bruno Kessler, Trento, Italy  
Email: [dragoni@fbk.eu](mailto:dragoni@fbk.eu)