Dhruv **Nevatia**

COMPUTER SCIENCE · STUDENT

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Personal

Born	21.05.1999; Kolkata, West Bengal, India
Languages	English (Native), Hindi (Native), Bengali (Native), Marathi (Professional), German (Basic)

Education

ETH Zürich *2022——-*
PhD. IN COMPUTER SCIENCE

Chennai Mathematical Institute, India *2020-2022*
M.Sc. IN COMPUTER SCIENCE

Chennai Mathematical Institute, India *2017-2020*
B.Sc. (HON.) IN COMPUTER SCIENCE AND MATH

Past and ongoing research

Formal Analysis of DNS *ETH Zürich, Switzerland*
DAVID BASIN *Dec 2022 -*

I am building a formal framework for complete verification of DNS behaviour dictated by a zone file configuration statically, using existing and new formal techniques.

Policy Change *ETH Zürich, Switzerland*
DAVID BASIN *Feb 2023 - Sep 2023*

We investigate and construct a generic algorithm for allowing policy change in runtime monitoring applications.

Coyote project *Microsoft Research, India*
AKASH LAL *Aug 2021 - Feb 2022*

I improve the existing algorithms for systematic testing of multi-thread shared memory programs in the Microsoft Coyote tool.

Aperiodic Two-way Nested Weighted Automata and Full Weighted FO *LIS, Marseille*
BENJAMIN MONMEGE *Jun 2022 - Aug 2023*

We consider the full unrestricted fragment of weighted First-Order logic with binary products and right-left sequential products, and develop an equivalent weighted automaton model for the same.

MSc Thesis *IIT, Bombay*
S. AKSHAY *Jan 2022 - Jun 2022*

I develop graph semantics and appropriate logical characterization to capture the behaviour of register automata in a unified approach to reduce the emptiness problem of register automata to satisfiability of a logical formula. I look at restrictions of these structures to deduce decidability, further looking into a 2-way extension of the model with the same properties.

An algebraic approach to universal automaton *IRIF, Paris*
THOMAS COLCOMBET, DANIELA PETRISAN *May 2020 - Aug 2020*

We introduce a coarsest congruence on a new kind of bimachine to construct a quotient isomorphic to the universal automaton, a model primarily useful for construction (/approximation) of a minimal state NFA for a regular language among many other interesting properties. We further investigate the same in a categorical lens for languages over monad algebras.

A Characterisation of First-Order Logic with Neighbour *IIT Goa*
AMALDEV MANUEL *Jun 2019 - Feb 2020*

We propose a notion of variety for regular languages that are closed under the reverse operation. We first observe that there is an Eilenberg-type correspondence between our proposed notion of varieties and pseudovarieties of hermitian semigroups. As an application it is shown that the class *Weak Locally Threshold Testable*, those languages that are definable in first-order logic with adjacency predicate, corresponds to the locally-hermitian block product of the pseudovarieties $\mathbf{Acom}^\star$ and $\mathbb{L}\mathbf{1}^h$.

Publications

An Automata Theoretic Characterization of Weighted First-Order Logic
with Benjamin Monmege, Accepted in **ATVA 2023**
An algebraic characterisation of First-Order Logic with Neighbour
with Amaldev Manuel, Accepted in **LICS 2021**

Supervision and Teaching

2023	**Teaching Assistant**, Discrete Mathematics	*ETH Zürich*
2023	**BT Supervisor**, Sümer Sarp, Implementing Timed Lossy Channel Systems in Haskell	*ETH Zürich*
2023	**Teaching Assistant**, Formal Methods and Functional Programming	*ETH Zürich*
2022	**Teaching Assistant**, Theoretical Informatics	*ETH Zürich*
2020	**Teaching Assistant**, Theory of Computation	*CMI*
2020	**Teaching Assistant**, Mathematical Logic	*CMI*
2019	**Teaching Assistant**, Introduction to Programming in Haskell	*CMI*
2018	**Lecturer**, Abstract Algebra course for JEST applicants	*CMI - IMSc*

Technical Skills

Programming languages	Haskell, Python, C++, C#, JAVA, Rust, F*
Tools	Nekara, Coyote, Coq, NuSMV, Z3, CBMC, Cadical, Proverif, Cryptoverif