

Minh Nguyen

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Education	PhD, Computer Science, University of Bristol (Ongoing) 2020-24 Supervisors: Meng Wang, Roly Perera
	MEng, Computer Science, First Class Honours, University of Bristol 2015-19 2018-19 - 1st Class, (71) 2017-18 - 1st Class, (76) 2016-17 - 1st Class, (80) 2015-16 - 1st Class, (76)
Research Interests	My current research investigates the formalisation and implementation of algebraic effects, extensible data, and row polymorphism in embedded probabilistic programming languages. The intention is to encode probabilistic models as first-class citizens (hence being modular and composable) whilst being simultaneously general-purpose (i.e. suitable for all forms of simulation and inference). Related to this is the exploration of how complex inference algorithms can be modularly implemented using effect handlers to perform composable program transformations on models. My other interests include functional programming (in particular, Haskell), type-level programming, type theory, embedded domain-specific languages (eDSLs), and recursion schemes.
Skills	Languages <i>Haskell</i> <i>Scala, Idris, C, C++, C#, Javascript</i> (Previous experience) Technologies I have thorough experience with a vast amount of web development frameworks and APIs. I also have experience in using data-science and machine learning libraries, concurrent and parallel multi-processing technologies, graphics engines, and language parsing libraries.
Projects	“Linked Visualisations via Galois Dependencies” Jan, 2022 POPL ‘22 <i>R.Perera, M.Nguyen, T.Petricek, M.Wang</i> This presents new language-based data provenance techniques for linking visualisations and other structured outputs to data in a fine-grained way, allowing a user to interactively explore how data attributes map to visual or other output elements by selecting (focusing on) substructures of interest. This builds on bidirectional program slicing techniques based on Galois connections.
	“Composable, Modular Probabilistic Models” Aug, 2021 ICFP ‘21, ACM Student Research Competition <i>M.Nguyen, R.Perera, M.Wang</i> This describes an algebraic effect-oriented embedded DSL in Haskell for modularly defining probabilistic models as first class citizens which can be reused for both simulation and inference. It is then demonstrated how simulation and inference algorithms can be expressed naturally as composable program transformations using algebraic effect handlers.
	“Modelling Neural Networks with Recursion Schemes” Jul, 2019 Masters Dissertation <i>M.Nguyen, N.Wu</i> This investigates and implements (in Haskell) the previously unexplored notion that neural networks can be defined as recursive data structures and that their training can be encoded as a recursion

scheme system. More specifically, a common property is shown of being able to model forward and back propagation as compositions of catamorphisms (folds) and anamorphisms (unfolds); this is demonstrated across fully-connected networks, convolutional networks, and deep LSTM networks.

Talks	“Composable, Modular Probabilistic Models”	Sep, 2021 IFL ‘21
Teaching	<p>Dissertation Supervisor Main supervisor for a 4th year student on their masters dissertation, entitled “Deep Learning Architectures as Pure Functions”.</p> <p>Advanced Topics in Programming Languages (COMSM0066) Language Engineering (COMS22201) Development of lab worksheets and implementation of toy interpreters and compilers in Haskell, covering topics such as type checking, polymorphic types. and type inference.</p> <p>PL Seminar Speaker I give talks/seminars about Haskell, functional programming, or my own research, to the Programming Languages Research Group and undergraduates.</p> <p>Functional Programming (COMS10016) Teaching assistant for the first year functional programming unit. Attending weekly two-hour lab sessions to mentor students in beginner-to-intermediate concepts and approaches to problem-solving in Haskell and functional programming. Marking exams.</p>	<p>2020-21 University of Bristol</p> <p>2020-21 University of Bristol</p> <p>2019-21 University of Bristol</p> <p>2017, 2019-20 University of Bristol</p>
Awards	<p>ICFP ‘21, ACM Student Research Competition, 1st Place This corresponds to one of my PhD projects, entitled “Composable, Modular Probabilistic Models”.</p> <p>Bloomberg Award - Best Machine Learning Project This corresponds to my masters dissertation entitled “Modelling Neural Networks with Recursion Schemes”.</p> <p>Graphcore Award - Best Group Project This comprised the development of a VR Horror Game, in which I was responsible for programming the player mechanics and enemy AI, and the game interaction/event system. This used C#, Unity, Oculus Rift and Touch, and a Bluetooth Heart Rate Monitor.</p> <p>Netcraft Award - Top Ten Achieving CS Students</p>	<p>Aug, 2021 ICFP ‘21</p> <p>Jul, 2019 University of Bristol</p> <p>Jul, 2018 University of Bristol</p> <p>Jul, 2017 University of Bristol</p>