

Reasoning with Diagrams

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Abstract

Diagrams are often used to transfer knowledge between parties. A practical example of this can be seen when engineers discuss software architecture using a UML class diagram. These real-world diagrams are often informal or, at best, semi-formal. The process of reasoning using these informal diagrams is therefore necessarily informal. One consequence of informal reasoning leads to a difficulty in providing computerised tool support to aid reasoning. What if we could provide a completely formal diagrammatic reasoning system? Can a completely formal diagrammatic reasoning system be engineered so that it is considered usable by students, engineers and research scientists?

In this talk I explain the developments in 20 years of research on diagrammatic logic at the University of Brighton. Our diagrammatic logics are originally inspired by the work of Kent titled “Constraint Diagrams: Visualizing Invariants in Object Oriented Modelling”. Kent’s paper provides a vision of a highly-expressive visual logic that is suitable for modelling constraints in a software development environment. Over 20 years we have taken a bottom-up approach to achieving this vision by building on Shin’s seminal development of sound and complete reasoning over a modification of Venn diagrams.

The talk will cover the development of our diagrammatic logics. In addition we will take a short detour into the intersection between diagrammatic logic and the class of regular languages. Finally, I will include some current and future work, much of which is in conjunction with Beryl Plimmer of the University of Auckland.

Biography

Aidan graduated in 2002 from NUI Maynooth in Ireland. He obtained his PhD, via the scenic route, at the University of Brighton in England where he now works as a senior lecturer. He teaches a range of courses including computer games development to undergraduates and theoretical computer science to postgraduates. His main research interest is in diagrams, spanning the gamut

from diagram creation through formal representation of diagrams to reasoning using diagrams. He is an enthusiastic social rugby player who is glad that the faster, bigger and younger players are a few leagues above his team.