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NITheCS Colloquium
Monday, 7 February 2022, 16h00 – 17h00
Prof Zurab Janelidze (University of Stellenbosch)

"Noetherian information systems"

ABSTRACT

Noether isomorphism theorems in abstract algebra describe the behaviour of operations on substructures of a wide variety of algebraic structures. These theorems were originally formulated for modules over a ring. However, it was soon clear they are valid for other similar algebraic structures as well. One of the active areas of research in category theory deals with understanding unifying principles of algebraic structures, seen from the lenses of a category. But a category is nothing other than a network (in some sense), and where there is a network, there should be an information system!

It turns out that in equipping a category with a suitable "information system", it becomes possible to recover Noether isomorphism theorems (and many other homomorphism theorems) in that category. This raises several interesting questions in mathematics, including the search for a "Noetherian information system" for various concrete categories.

In this talk I will motivate the axioms that define such an information system using the intuition for a plausible information system over a real-life network. I do not know yet whether consideration of such information systems can have any uses in real life, but the mathematical story seems to suggest that this may well be the case.

BIOGRAPHY

Zurab Janelidze is a Principal Investigator in a 2021 Research Programme at NITheCS, entitled "*Space-like mathematical structures and related topics in algebra, logic and computation*". He is a Professor of Mathematics at Stellenbosch University, in the Department of Mathematical Sciences. He currently serves as the President of the South African Mathematical Society.

Zurab's main research area is a branch of category theory called categorical algebra. His broader research interests include category theory, universal algebra, set theory, logic, topology, combinatorics, computational mathematics and applications of abstract mathematics in other sciences.

He serves on the editorial boards of *Applied Categorical Structures* and *Cahiers de Topologie et Géométrie Différentielle Catégoriques*. These are two of the three main international journals dedicated to category theory.

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