Departamento de Matemática

Centro de Matemática e Aplicações

Seminar/Talk

Categorical Structures and Programming Paradigms in MATLAB and Octave

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Abstract: This seminar presents recent advances in the categorical modeling of programming languages, focusing specifically on MATLAB and Octave as environments where complex-valued matrices serve as the fundamental data structures. We introduce a category-theoretic framework that captures the essence of programming operations and functions within these languages. By interpreting indexation as function composition, we analyze the categorical properties of key built-in functions such as unique, ismember, sortrows, and sparse. Additionally, the talk explores methods to transform arbitrary graphs, represented by pairs of complex-valued matrices, into indexed categorical structures with well-defined surjective indices. We also discuss the implementation of programming functions demonstrating categorical behaviors analogous to coequalizers. This work offers a new lens through which to understand and design programming constructs, bridging abstract category theory with practical computational applications in widely used numerical programming languages.

Bibliography:

[1] N. Martins-Ferreira, Internal Categorical Structures and Their Applications, Mathematics (2023) 11(3), 660; https://doi.org/10.3390/math11030660

[2] N. Martins-Ferreira, On the Structure of an Internal Groupoid, Applied Categorical Structures (2023) 31:39 https://doi.org/10.1007/s10485-023-09740- 1

[3] N. Martins-Ferreira, "Categorical Analysis of MATLAB and Octave Programming Function", Itaca Fest 2025, ItaCa, Italy (Online Seminar talk 15Apr2025).

https://www.youtube.com/watch?v=Wlz9beqpwqY

- **Dia:** 25 de Junho de 2025, às 14h30min.
- **Local:** Sala de Reuniões, Departamento de Matemática, UBI

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