

Introduction to Discrete Morse Theory

Pedro Chocano Feito

Discrete Morse theory was introduced by Forman in 1998. It is a generalization of the classical Morse theory developed during the twentieth century.

In this talk we will introduce the basic concepts and results of the theory. For the sake of the exposition we will focus in simplicial complexes despite that the results are also valid for CW-complexes. Furthermore, we are going to give a different approach to the theory starting with the definition of vector field instead of Morse function in order to motivate better the main ideas. Finally, we will give some examples and mention possible generalizations of the theory.

References:

- [1] R. Forman. Morse Theory for Cell Complexes, *Advances in Mathematics* 134(1998), 90-145.
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- [3] R. Forman. A User's Guide to Discrete Morse Theory *Séminaire Lotharinen de Combinatoire* 48 (2002), Article B48c.
- [4] T. Kaczynski, M. Mrozek, Th. Wanner, Towards a formal tie between combinatorial and classical vector field dynamics, submitted, IMA Preprint Series #2443 (November 2014).