

# Summary of Benjamin Pollak's ARTU Research

Xiang Tang

Categorification is a mathematical process to replace set-theoretic theorems by category-theoretic analogues. The main idea is to enrich a classical object in mathematics by a category (or maybe a higher category), and through such enrichments one uncovers deeper and new properties of the classical object. The following is a good example of this idea. Consider the  $K$ -theory groups of vector bundles on a manifold. The  $K$ -groups are topological invariants of a manifold. A good categorification of  $K$ -groups is the category of vector bundles (coherent sheaves) over a manifold, which contains much more information than the  $K$ -groups.

Benjamin Pollak studied this exciting topic in his ARTU research. In particular, he focused on the groupoidification theory, which was developed by John Baez and his collaborators. Groupoidification is a special type of categorification that does linear algebras with groupoids, a special type of categories, instead of vector spaces.

Inspired by the idea of groupoidification, Benjamin Pollak started an interesting project of groupoidifying continuous functions on topological spaces. He has made significant progress in this project. Pollak showed that every continuous function on a nice topological space has a groupoidification. This is a solid first step in his attempt to categorify functional analysis.