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On the matroid representation over finite rings

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Matroids introduced by H. Whitney abstract some properties of linear independence among vectors in a vector space over a field. Nevertheless, it is well-known that almost all matroids are non-representable as a set of vectors over a field. It is one of the most significant problems to determine whether a given matroid is representable over some field. In this talk, we propose some representations of matroids by using matrices over finite rings. We will provide a method to construct a matroid by a matrix over a finite ring and some conditions for a matrix over a finite ring to yield some matroid. We also show that some well-known non-representable matroids can be represented by a matrix over a finite ring by our construction.

Primary author: IMAMURA, Koji (Kumamoto University)

Co-author: Prof. SHIROMOTO, Keisuke (Kumamoto University)

Presenter: IMAMURA, Koji (Kumamoto University)