Presentation of FUJITA Ryo

Title : Symmetries and representation theory

Abstract : In mathematics, we can understand the symmetry of a mathematical object (such as a polygon, sphere, or higher dimensional space) as a whole set of operators under which the object is invariant. Such a set carries a natural algebraic structure, axiomatized as the notion of groups or Lie algebras for example. Conversely, given such an algebraic structure, we may view it as an abstracted symmetry, and consider giving it a concrete realization as a symmetry of a vector space. This leads us to the notion of "representations". Since a symmetry of a vector space can be described concretely in terms of matrices, we obtain various numerical information from such representations. "Representation theory" is a field of mathematics which aims at understanding various algebraic structures through such "representations". In this talk, I would like to introduce the notion of representations, without any preliminary knowledge of mathematics, and explain what kind of problems the representation theorists (including myself) may concern.