
LIAM GAUVREAU, University of Toronto

Symmetries in Tensor Spaces: An Introduction to Schur-Weyl Duality

Given a finite-dimensional vector space V , the groups S_n and $\mathrm{GL}(V)$ both have natural actions on the tensor space $V^{\otimes n}$ which commute. Schur-Weyl Duality asserts the images of these two actions in $\mathrm{End}(V^{\otimes n})$ are centralizers of each other. We discuss how the double centralizer theorem paired with this duality reveals a deep connection between the representation theory of the symmetric group and the general linear group, generalizing the well known decomposition $V \otimes V = \mathrm{Sym}^2 V \oplus \mathrm{Alt}^2 V$.