

DUSTPAN distributions as limit laws for Mahonian statistics on forests

Josh Swanson

Department of Mathematics
University of Southern California

Abstract

Building on work of Stanley and Björner–Wachs, we study the distribution of certain Mahonian statistics on several families of posets, including the major index on linear extensions of forests. We show that the resulting standardized distributions are often asymptotically normal. However, in certain regimes, we must introduce a new, closed family of continuous probability distributions called DUSTPAN distributions which simultaneously generalize the Irwin–Hall and normal distributions. In the case of forests, we use graph-theoretic statistics like height and elevation to completely determine the precise limit laws. This leads to some natural open questions about the distribution of the height of such forests.

Joint work with Sara Billey (<https://arxiv.org/abs/2010.12701>) building on earlier joint work with Sara Billey and Matjaž Konvalinka (<https://arxiv.org/abs/1905.00975>).