

Moyal Medal Presentation and Lecture

Presented by the Faculty of Science and Engineering

Abstract and Medalist Bio



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Abstract

Up and Down: The Challenge of Double Descent

Recent widespread adoption of big data and AI has revealed a puzzling phenomenon in statistical machine learning called "double descent". The surprising double descent behaviour arises from the interplay between model complexity, data distribution and optimization dynamics during the training phase of a statistical machine learning model.

In a nutshell, double descent works like this:

1. Increasing complexity by adding more parameters initially improves model performance.
2. At a certain point, more parameters make the model less reliable.
3. Surprisingly, continuing to add even more parameters then improves performance again, often surpassing the initial peak.

This pattern challenges the belief that simpler models are generally better, prompting a rethink of fundamental statistical ideas. The lecture will use visualisation to explain double descent, why it occurs, how it challenges statistical thinking, and its implications for statistical practice.

Biography

Professor Alan Welsh | Australian National University



Professor Alan Welsh is the EJ Hannan Professor of Statistics at the Australian National University (ANU). He was an undergraduate at the University of Sydney and obtained his PhD from ANU in 1985. He was an Assistant Professor at the University of Chicago (USA) from 1984-1987 before taking up a lectureship at the ANU. He held the Chair of Statistics at the University of Southampton (UK) from 2001-2003, returning to the ANU in 2004.

Alan is a Fellow of the Australian Academy of Science (2007), the Institute of Mathematical Statistics (1990,) and of the American Statistical Association (2002). He was awarded the Moran Medal of the Australian Academy of Science in 1990, the Pitman Medal of the Statistical Society of Australia in 2012, the E.A. (Alf) Cornish Award of the Australasian Region of the International Biometric Society in 2017, Honorary Life Membership of the International Biometric Society in 2018 and the Hannan Medal of the Australian Academy of Science in 2019. He was the Editor-in Chief of the *Australian and New Zealand Journal of Statistics* from 2012-2015 and a Co-Editor of *Biometrics* from 2020-2022.

