NITheCS
National Institute for Theoretical and Computational Sciences

NITheCS Colloquium
Monday, 21 February 2022, 16h00 – 17h00
Prof Anna Scaife (University of Manchester)

"AI in the SKA Era: Challenges for recovering well-calibrated uncertainties from Bayesian Deep-learning"

ABSTRACT

The expected volume of data from the new generation of scientific facilities such as the Square Kilometre Array (SKA) radio telescope has motivated the expanded use of semi-automatic and automatic machine learning algorithms for scientific discovery in astronomy. In this field, the robust and systematic use of machine learning faces a number of specific challenges including a paucity of labelled data for training (paradoxically, although we have too much data, we don't have enough), a clear understanding of the effect of biases introduced due to observational and intrinsic astrophysical selection effects in the training data, and motivating a quantitative statistical representation of outcomes from decisive AI applications.

In this seminar I will talk specifically about the challenge of recovering well-calibrated uncertainties from Bayesian neural networks when classifying radio galaxies, a canonical example of a radio astronomy AI application. I will discuss how both model and likelihood misspecification can affect this calibration, how these effects potentially contribute to the cold posterior effect seen when building models using real astronomical data and what steps we can take to address these problems.

BIOGRAPHY

Anna Scaife is Professor of Radio Astronomy at the University of Manchester, where she is head of the Jodrell Bank Interferometry Centre of Excellence and academic Co-Director of Policy@Manchester. Her research focuses on the use of artificial intelligence for discovery in data-intensive astrophysics and is supported by the UK's Alan Turing Institute.

She has previously led projects in technical radio astronomy development and scientific computing as part of the Square Kilometre Array project, including the design of the computing and storage for a European SKA Regional Data Centre.

In addition to her scientific work, Anna runs two training programmes that provide bursaries for students from Southern Africa and Latin America.

In 2014, Anna was honoured by the World Economic Forum as one of 30 scientists under the age of 40 selected for their contributions to advancing the frontiers of science, engineering or technology in areas of high societal impact.

In 2017 she was awarded the Blaauw Chair in Astrophysics (prize chair) at the University of Groningen in the Netherlands for excellence in research, broad knowledge of astronomy and an outstanding international status in astronomy.

In 2019, Anna received the Jackson-Gwilt Medal of the Royal Astronomical Society, awarded for outstanding invention, improvement or development of astronomical instrumentation or techniques.

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