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ML and AI challenges in current and future optical and near infra imaging datasets

Tuesday 18 September 2018 10:00 (30 minutes)

Professor Richard McMahon, Professor of Astronomy, Director and Head of Department, Institute of Astronomy, University of Cambridge

Abstract: I will present an overview of non-radio imaging current and future challenges based on current ground and space based optical and near infrared imaging surveys; DES/VISTA/Gaia -> Euclid/LSST. Current surveys are producing PB scale imaging datasets at a range wavelengths, depths and spatial resolution. 1-3 billion row source catalogues per survey with many thousands of columns which are overwhelming incoming graduate students and Post Docs who have not dealt with data on these scales before. I will use some examples of rare object searches (the most luminous super massive black holes in the Epoch of Reionization; Gravitionally lensed quasars for measuring the rate of expansion of the Universe and characterising Dark Matter and Dark Energy) and new phenomenon which get swamped by gaussian and non-gaussian outliers and instrumental artefacts. We are starting to explore ML and AI techniques at the catalogue and image level. I speak as a newcomer to ML and AI, but with 30 years of domain experience working on the large scale datasets and will highlight some of the domain level challenges we face and lessons already learnt in terms of dealing with bad data, incomplete and ambiguous meta-data.

Bio: Richard McMahon is the Director of the Institute of Astronomy, University of Cambridge. He is an observational astronomer with over 30 years of experience in instrument design and data management starting with large scale of photographic surveys with giga-pixel images. He was a member of the team that discovered the accelerating expansion of the Universe through the discovery and observations of distant supernovae. Richard's research interests span the discovery and observation of the most distant objects in the Universe in the Epoch of Reionization; development of instrumentation and computational data analysis techniques centered around large scale data intensive techniques using optical and infra-red imaging and spectroscopic sensors on telescopes around the world (primarily in Chile) and in Space using Gigapixel cameras and Petsacale multi-wavelength datasets. Richard is PI of the VISTA Hemisphere Survey and has 'Builder'status membership of the Dark Energy Survey. He is also the 4MOST Extragalactic Project Scientist.

Presenter: Prof. MCMAHON, Richard

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