PhD Colloquium – Dottorato in Ingegneria Industriale
Dipartimento di Ingegneria Industriale
Università degli Studi di Napoli Federico II

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Scalable additive stacking models for electricity demand forecasting

FRIDAY, MAY 13rd, 2022, 15:00-16:30,

Università degli Studi di Napoli Federico II, Scuola Politecnica e delle Scienze di Base,
Dipartimento di Ingegneria Industriale,
Piazzale Tecchio 80
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The **PhD colloquium** is a platform for PhD students to present their research interests, theories and progress to an audience of their peers.

Introduction: **Dr. Christian Capezza**, Dipartimento di Ingegneria Industriale

Abstract Short-term electricity demand forecasts are regularly used to inform decisions in grid management. However, the increasing reliance on renewable production will create a new challenge in demand forecasting. Renewable energy sources are less centralised and often dependent on external factors such as weather. To limit the need for large-scale and expensive storage infrastructure, smart grid management systems can be employed. These systems will require reliable demand forecasts at lower levels of aggregation, possibly down to the individual household level. At this level, demand is characterised by a low signal-to-noise ratio, with frequent abrupt changepoints in demand dynamics. The challenges posed by forecasting at a low level of aggregation motivate the use of an ensemble approach that can incorporate information from several models and across households. The idea of additive stacking for probabilistic forecasting was proposed by Capezza et al. (2021). However, the number of models that could be used was limited as the number of unknown parameters in the stacking model scales linearly with the number of experts

In this talk, we will discuss more scalable solutions for additive stacking. Specifically, we explore the idea of adding structure to the weights to reduce the number of parameters required. This provides modelling advantages by reducing both computational complexity and the risk of overfitting. The area of application is not limited to demand forecasting, but extend to any setting where ensemble modelling is used.

References: Capezza, C., Palumbo, B., Goude Y., Wood, S.N., Fasiolo, M. (2021) Additive Stacking for Disaggregate Electricity Demand Forecasting. *The Annals of Applied Statistics*, 15(2):727-746

Euan Enticott graduated from the University of St Andrews in 2020 with an MMath in mathematics and statistics. Here he focused on data science and statistics whilst undertaking a project in statistical ecology, modelling the behaviour of snow leopards with the use of spatial data. He has a keen interest in programming, particularly with R and Python and look to use these within the field of Spatial Statistics or Bayesian Modelling. He has joined the Centre for Doctoral Training in Computational Statistics and Data Science (COMPASS) programme looking to enhance these skills so that he is able to use data driven solutions to tackle some of the real world problems facing us today. He is now working with Dr Matteo Fasiolo and Professor Nick Whiteley on a project entitled *Scalable Additive Models for Forecasting Electricity Demand and Renewable Production*, to build models for consumption that are able to quickly adapt to market shocks.

https://compass.blogs.bristol.ac.uk/students/euan-enticott/