Meadhbh **O'Neill**

PhD · Statistical Data Science

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Profile

Highly motivated individual studying statistical data science within the Confirm Smart Manufacturing Centre and the Mathematics Application Consortium for Science and Industry (MACSI) in the University of Limerick. My research involves creating state-of-the-art methodology using modern statistical techniques for optimizing manufacturing processes. My work includes the development of novel variable selection methods, which can be used to gain meaningful insights into the key drivers of a process. I have had a leading role in several high-impact interdisciplinary projects, where I have strengthened my communication, teamwork and problem-solving skills while working closely with industry experts.

Education

University of Limerick *Limerick, Ireland*

PhD in Statistical Data Science (Expected May 2023) *2018 - 2023*

BSc in Financial Mathematics (1.1 — First Class Honours Degree) *2014 - 2018*

Industry Projects

Multinational Pharmaceutical Company Completed *May 2021 - April 2022*

- Implement statistical models to extract meaningful information from large-scale high-throughput data measured via state-of-the-art metrology throughout the manufacturing process.
- Development of new, robust and flexible statistical models for multivariate sensor data using functional data analysis.
- Establishment of novel models for temporal derivatives (i.e., velocity and acceleration) with uncertainty estimates.
- Construction of innovative prediction models, which capture between- and within-production line uncertainty.

Multinational Medical Device Company Completed *Dec. 2020 - March 2021*

- Investigate potential insights from manufacturing execution system (MES) data.
- Statistical analysis of performance metrics including workload, scrap and idle time.
- Construction of control limits to assess variability in different workstations, shifts, days of the week.
- Development of an interactive dashboard providing a clear view of overall daily performance.

Multinational Electronics Company Completed *June - Aug. 2019*

- Gain a deeper understanding of the behaviour of a device through its voltage response curve.
- Creation of a clustering algorithm to identify different shapes of voltage curves statistically.
- Mapping of the curves to a physical failure mechanism using a mathematical model.
- Obtain new insights into device failure modes and device-level variability.
- Creation of an interactive dashboard that provides visual exploration of the failure location and automated clustering.

Skills

Statistical Modelling Multivariate regresion analysis, predictive models, clustering, decision trees

Programming R (tidyverse, tidymodels, mlr3, XGBoost, Shiny, knitr, data.table), SPSS

Essential Technical report writing, clear delivery of presentations, critical thinking, curiosity

Publications

Robust Distributional Regression with Automatic Variable Selection *2022*
arXiv:2212.07317 [stat.ME]
O'Neill, M. and Burke, K.

smoothic: Variable Selection Using a Smooth Information Criterion *2022*
CRAN R package version 1.0.0
O'Neill, M. and Burke, K.

Variable Selection Using a Smooth Information Criterion for Distributional Regression Models *2021*
Statistics and Computing (Accepted for Publication)
O'Neill, M. and Burke, K.

Process Visualization of Manufacturing Execution System (MES) Data *2021*
2021 IEEE SmartWorld, pp. 659-665. doi: 10.1109/SWC50871.2021.00098
O'Neill, M., Morgan, J., and Burke, K.

Differentiable Penalized Regression *2019*
The 39TH Conference on Applied Statistics in Ireland (CASI)
O'Neill, M. and Burke, K.

Presentations

The 15th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics) *King's College, London*
Robust Distributional Regression Models with Automatic Variable Selection *December 2022*
O'Neill, M. and Burke, K. (Conference Presentation)

The 36th International Workshop on Statistical Modelling (IWSM) *University of Trieste, Italy*
Automatic Variable Selection in Distributional Regression Models *July 2022*
O'Neill, M. and Burke, K. (Conference Presentation)

The 42nd Conference on Applied Statistics in Ireland (CASI) *University College Cork, Ireland*
Robust Distributional Regression with Automatic Variable Selection *May 2022*
O'Neill, M. and Burke, K. (Conference Presentation)

The 4th International Conference on Econometrics and Statistics (EcoSta) *HKUST, Hong Kong*
Smooth BIC Variable Selection Procedure for Heteroscedastic Data *June 2021*
O'Neill, M., Gleeson, J.P., and Burke, K. (Conference Presentation)

Invited Seminar at The Division of Mathematics for Vehicle Engineering *Fraunhofer ITWM, Germany*
Industrial Feature Selection Using a Smooth Information Criterion *June 2021*
O'Neill, M., Gleeson, J.P., and Burke, K. (Seminar)

Accomplishments

Global Young Scientists Summit (GYSS) Selection *January 2022*
Based on my achievements to date and my contribution to several industrial projects, I was nominated and chosen to attend the 10th anniversary edition of the GYSS after a highly competitive selection process. The theme of GYSS 2022 was "Advancing Science, Creating Technologies for a Better World". It was an exciting opportunity to interact and be mentored by Nobel laureates and eminent scientists, while also exchanging ideas with other young researchers.

References

References available upon request.