UiO : University of Oslo

Department of Mathematics
Section of Statistics and Data Science

Seminar Series in Statistics and Data Science

03.09.2019, 14:15 @ Erling Sverdrups plass, Niels H. Abels hus, 8th floor

Lara Lusa: On biases of (penalized) logistic regression when predicting rare events

Abstract: Logistic regression is one of the most commonly used statistical methods to estimate prognostic models that relate a binary outcome (with levels event and non-event) to a number of explanatory variables. A low event proportion, encountered frequently in clinical or epidemiological studies, causes unequal treatment of events and non-events in terms of their respective predictive accuracies (rare events bias). It is well known that maximum likelihood estimates of the regression coefficients in the logistic regression model are biased (small sample bias) and it it known that the bias is amplified when the sample size and the proportion of events are smaller. We explain that the rare events bias is not a consequence of small sample bias which can explain why the bias corrected estimates, as for example Firth's bias correction, cannot remove the rare events bias. We provide an explanation of the rare events bias by using some simulated examples as well as some theoretic results. The rare events bias is explained for the maximum likelihood and penalized likelihood estimation using some common penalty functions. We also explain why the intuitive solution of weighting the samples amplifies the rare events bias while under-sampling the non-events is efficient in removing the rare events bias.

Lara Lusa
University of Primorska (SLO)

Lara Lusa is an Associate Professor at the Department of Mathematics of the University of Primorska (SLO). She obtained her PhD in Applied Statistics at the University of Florence (ITA). After having worked as a Postdoctoral Fellow at the Italian National Cancer Institute and as a Researcher at the FIRC Institute of Molecular Oncology of Milan (ITA), she became Associate Professor at the University of Ljubljana (SLO). In 2018 she moved to Koper (SLO), where she is currently working.

Next seminar

17.09.2019 @ 14:15 **Nicola Sartori**
University of Padova (ITA)

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