Machine learning in survival analysis: a support vector model approach

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Survival analysis is a well-established field in classical statistics concerned with data of the time to some event. In the standard case, the event is death or failure, but the topic in much broader. As a machine learning model, support vector models are rooted in the statistical learning theory and possess superior generalization capacity in many situations. Using the so-called kernel trick, it is convenient to solve non-linear problems in arbitrarily high dimensional feature spaces. In this presentation we expose a support vector model to regression with censured data, also known Support Vector Censured Regression (Shivaswamy et al. 2007). The model procedure is exemplified with an application in time to response a real online survey and compared with the traditional Cox proportional-hazards model.

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Efficient Closed-Form Estimators for embedded systems

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Embedded systems are commonly used in communication engineering. Particularly, they can consist of an electronic system inside a microcontroller, which can be programmed to maintain communication between a transmitting antenna and mobile antennas, which are operating at the same frequency. In this context, from the statistical point of view, closed-form estimators are needed, since they are embedded in mobile devices and need to be sequentially recalculated at real time. In this talk, we discuss the proposition a maximum a posteriori estimator, which has a simple closed-form expression. We focus on the Nakagami distribution, which plays an essential role in communication engineering problems, particularly to model fading of radio signals. In a second phase of the presentation, we show that the obtained results can be extended to other survival probability distributions, such as the gamma and generalized gamma ones. Numerical results reveal that our estimator outperforms the existing ones and produces almost unbiased estimates even for small sample sizes. This work is co-authored by Pedro Luiz Ramos, Eduardo Ramos, and Dipak Dey.

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Applications of Artificial Intelligence and a Particular Case in Medical Diagnosis

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Artificial Intelligence (AI) has attracted a lot of attention from researchers and general media due to the impressive results that some technique has achieved in recent literature. Many claims that AI will be a driving force in the world economy in the coming decades, revolutionizing areas of expertise such as engineering, medicine, public safety, among others. We will present some recent and relevant applications, as well a discussion about their implications in our society and the role of the professionals who collaborate with the world of AI. In particular, we will present an application of a model for diagnosis assistance, that makes the classification of mammary nodes from mammography images using convolutional neural networks. This work is co-authored by Gabriela Borges.

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