

Master's thesis

about

Vuong test for model selection and its application to Machine Learning

Lehrstuhl für Finanzmathematik

The famous Vuong test (Vuong 1989) has been extensively used in Econometrics. It is a model comparison test, where both competing models are allowed to depend on estimated parameters. Using the properties of the Kullback-Leibler information criterion it compares the expected log-likelihood ratio of the two optimal competing models to decide if one model should be preferred over the other to describe a given set of independent observations of some experiment. In recent years (Shi 2015, Schennach and Wilhelm 2017, Liao and Shi 2020) its main weakness, the necessity of a pre-test for equality of both models, has been overcome. So far, the Vuong test only been applied to quite simple models and its applications to more sophisticated methods have not been investigated yet. The first part of this master's thesis is aimed at summarizing the recent developments in the literature about the improvements of the Vuong test. The second part of this master's thesis is aimed at applying the Vuong test to model selection of support vector machines, a novel approach for model selection in this field. This part will be based on the results of (Jiang, Zhang, Cai 2008), who derived the asymptotic normality of many kernel estimators.

For more information students can contact florian.brueck@tum.de.

If you are interested in writing your masters thesis about this topic you can send your application to bettina.haas@tum.de. The usual requirements for a master's thesis at the Chair of Mathematical Finance apply.

1. Quang H. Vuong; "Likelihood Ratio Tests for Model Selection and Non-Nested Hypotheses" ; Econometrica, 1989
2. Schennach, Susanne M and Wilhelm, Daniel; "A simple parametric model selection test" ; Journal of the American Statistical Association ; 2017
3. Shi, Xiaoxia ; "A nondegenerate Vuong test" ; Quantitative Economics ; 2015
4. Liao, Zheng and Shi, Xiaoxia ; "A nondegenerate Vuong test and post selection confidence intervals for semi/nonparametric models" ; Quantitative Economics ; 2020
5. Jiang, Bo and Zhang, Xuegong and Cai, Tianxi ; "Estimating the confidence interval for prediction errors of support vector machine classifiers"; Journal of Machine Learning Research ; 2008