**Master thesis project description**

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**Concentration of the master**: Research concentration

**Title of the Master Thesis**: *Uncertainty in time-series modeling – An application to the prediction of individual customer lifetime values*

**GSEM Supervisor’s information:** Prof. Dr. Markus Meierer

**Description of the Master Thesis**

Background

Every company has the goal of maximizing revenue and profit with the least possible inputs as they are limited. Departments of a firm are therefore competing for these resources, and so is marketing. Marketing managers must proof and justify their success and expenditures and therefore must make wise decisions on which customers to spend e.g. financial effort. Models like the pnbd model have been developed since the 1970s to support marketing managers in these decisions by providing predictions on the Customer Lifetime Value, CLV. As is the nature of prediction, they are not exact and strained with uncertainty.

Goal

This work will be concerned with the quantification of uncertainty in CLV prediction by implementing existing methods to derive prediction intervals. One method is the well-known bootstrap method. It is implemented in the R package CLVTools and shall be benchmarked with alternative approaches using different key metrics. As a first step, it will be necessary to identify which methods to derive prediction intervals are applicable in the CLV context. A special focus shall be put on Conformal prediction which is relatively new with approximately 20 years and gaining attention across industries and research domains.

Methods

As a basis for this work, a literature review will be conducted, concerning inter alia the presence of uncertainty in marketing, methods to derive prediction intervals and put a special focus on the application of conformal prediction in the time-series context. Applicable PI-methods shall be implemented in R. As a final step, the bootstrap method will be benchmarked against the competing methods by calculating key metrics, using real-world datasets. The results will be analysed and interpreted from an academic and managerial perspective.

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