

**Abstract:** In this thesis, the use of cross-validation methods in different areas of statistics is studied. Firstly, the application of leave-one-out cross-validation,  $CV(1)$ , for bandwidth selection in kernel density estimation and kernel regression tasks is considered. Theoretical findings are demonstrated on simulated data. Then, the selection of a linear model with the best predictive ability is explored. It is illustrated that, in the context of linear models, the use of  $CV(n_v)$  instead of the leave-one-out approach is advisable, where  $n_v/n \rightarrow 1$  as  $n \rightarrow \infty$ . The studied methods are applied on real data from parliamentary and presidential elections in the Czech Republic in 2021 and 2023.