**Introduction**

* …
* Full conformal prediction and ICP (Both introduced first by (8CP)
* Full conformal prediction less used in practice because of computation costs (…) -> Focus on ICP
* “explicit, non-asymptotic guarantees even without distributional assumptions or model assumptions” (1CP)
* “generate prediction sets for any model” (1CP)

**Split conformal prediction**

**Regression**

* “define the nonconformity of a new example (x, y) as the absolute value of the difference between y and the predicted value of the calculated from x and the old examples” (8CP)
* Address computational “inefficiency” with ICP (8CP)
* Procedure: (1CP)

1. Define heuristic notion of uncertainty (f^(y | x))
2. Define score function
3. Compute q
4. Use quantiles to make a prediction set

* Explain a bit more in words, real implementation for the CLV context will be done below

**Classification**

* “main difference between applying conformal prediction on classification problems versus regression problems is the choice of score” (1CP)
* “define the nonconformity of a new example as the absolute value of its difference from the average of the old examples” (8CP)

**Full conformal prediction (for regression)**

* “sacrifices statistical efficiency because it requires splitting the data into training and calibration datasets” (1CP)
* “avoids data splitting at the cost of many more model fits” (1CP)
* … from introduction for full conformal prediction in (1CP)
* Procedure: (1CP, 9CP)

1. The dataset has 250 values, take 249 and 1 value separately
2. For the one separate value, take x values that could be the outcome of the prediction
3. For each of the outcome values, fit a model, taking the 249 values and the first of the x possible predictions
4. Go through all x
5. Calculate for each run the residuals of the 249 training values and the 1 “test” value separately
6. When all x are finished for the 1 value: Take the 90% residual quantile of the 249 values, that might be 1.298
7. Find the smallest value of the x residuals that is below 1.298
8. That should be the desired quantile

**Time** **series**

**Implementation**

* Split conformal prediction
  + Homoskedasticity
  + Scale by prediction
  + Scale by variance
    - Estimate variance via the loop for each customer
    - Estimate variance via a lm with sole deviations
    - Estimate variance via a lm with “variances” from the loop
* Full conformal prediction